THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

VOLUME XVII.—No. 1. WHOLE No. 300. | NEW YORK, TUESDAY, JULY 2, 1872. | $3 PER ANNUM IN ADVANCE.

Stancliff's New Retort-Lid Fastenings.

The invention we describe here was patented by George Stancliff, of the Manhattan Gas Works, May 28, 1872. The following is a

SPECIFICATION

Describing a new and Improved Retort-Lid Fastening, invented by George Stancliff, of New York city, in the county and State of New York.

This invention has for its object to provide a means for securely fastening the lids of gas-retorts, and whereby the closing can be rapidly effected. The invention consists in the use of a hook-shaped sliding-link support, and in its combination with a cam-lever, whereby it is drawn tight.

At present the lids are usually closed by means of screws. Considerable time is required in opening and closing them, and more or less gas is consequently lost. By the use of my improved fastening, time and labor will be saved, and the loss of gas prevented.

A in the drawing represents the retort-lid, of suitable form, provided with two ears, *a* and *b*, that project from its ends. For the support of one of the ears, *a*, a fixed hook, *d*, is secured to the mouth of the retort B, while a sliding hook, *e*, for the support of the ear *b*, is fitted through the flange *f* of the retort, and provided with a cam-lever. *g*, at its inner end. When the lever is swung to bear with its eccentric part against the flange *f* or an enlargement thereof, the hook *e* will be drawn back to firmly hold the lid against the retort. When the lever *g* is swung up, the lid will be instantaneously loosened, and can be removed.

Having thus described my invention, what I claim as new, and desire to secure by letters patent, is—

The sliding hook *e*, provided with the cam-lever *g*, to serve as a support and fastening for a retort-lid, as set forth.

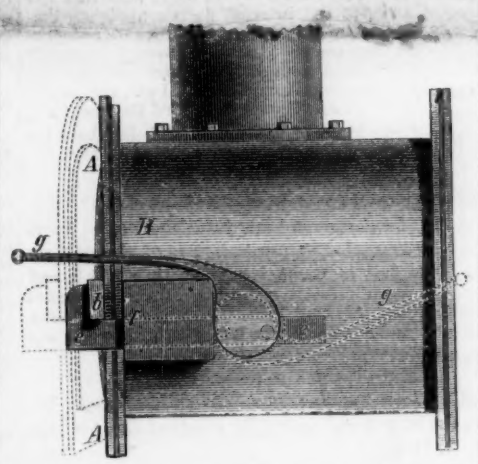
GEORGE STANCLIFF.

Witnesses: T. B. Mosher; Alex. F. Roberts.

As only those need to be told who are not gas men, the retort lid in almost universal use, at present, is secured, after being luted and put in place, by a horizontal "cotter-bar," passing through lugs at each end, and is pressed on by a screw which passes through this bar and is screwed up by the workman. Here there is loss of gas while the screw is being worked gradually up, and much consumption of time in screwing and unscrewing. By Mr. Stancliff's invention no time is lost, as the clamping up by the lever-cam moving through only ninety degrees, is practically instantaneous; and the loss of gas is reduced to a minimum.

A distinctive mark of Stancliff's plan is that there is no removal or attachment of anything (but the lid itself, with its luting). The cam is always there, in its place, ready for instant accomplishment of the desired purpose. It is well to throw in the information that there is a convenient attachment to the end of the levers, not shown in the drawing, which consists of an additional rod of greater or less length, according to the height of the retort in the bench, linked on to the lever, and having at its extremity a ring, which is convenient to the hand of the workman in clamping up. Loosening these lids is as momentaneous as tightening, being effected by merely striking up the end of the lever. Sometimes a lever may be bent, to avoid interference.

The saving in first cost is that of the cotter-bar and screw. This, however, is trifling compared to the current saving in time of the laborer and in loss of gas during closing. The time of fitting in the cotter-



bar and screwing up, is considerable in each case, and in the aggregate, in large works, *very important*. It must be about the same in detaching and unscrewing. Each practical man can calculate the amount of these two savings by timing the operation, as the time of putting up the lids is the same in each case of course. In a large works, this aggregate saving might count up to the daily labor of several men, Even the saving of gas would, however, often pay in one year double the amount of the first cost of making the change.

It is, moreover, no trifling consideration that the men themselves are found to be at once delighted with the change, and with the simplicity and ease of manipulation, and the want of complication in this device. The smaller liability to fracture, over the cotter-bars, which are often thrown down on the pavement with violence, through haste, is also no small matter. So that a much greater degree of durability than under the old system, is assured.

In practice there has not been found to be any wear on the cams, which might by some be imagined as an objection; all the pressure that comes on them being in fact, that needed to squeeze up that soft lute.

We must certainly conclude, in view of the obvious and rare peculiarities of this invention, at once simplifying, economical, and economizing (a combination of qualities not often seen, in gas inventions particularly), that no gas man is justifiable in not proceeding at once to satisfy himself, by personal examination, and actual observation of its working. This we have done with care, and thus speak from the book.

It is in use in the Manhattan Works, at the Eighteenth street station, where, as is familiarly known, any one of the fraternity, indeed any other man, will meet with all courtesy. Mr. Stancliff himself is to be found there constantly, and can at all times be conferred with.

New Form of Sounding Flames.

The phenomenon of the so-called sensitive flames is a well known one. Several years ago Count Schaffgotsch and Tyndall made more accurate observations of them, and discovered a series of new facts, which furnished the key to a correct explanation of the imposing phenomena. One of the most interesting phenomena discovered and examined by both investigators, is the sensitiveness of flames burning in tubes to the action of external sounds. Tyndall also found that exposed flames, and even jets of non-combustible gases rendered visible by mixing smoke with them, exhibit the same sensitiveness. It may not be known, at least in scientific circles, that exposed flames are capable of responding to corresponding tones. If a tuning fork be set in vibration, either by means of a violin bow or by striking it, and then brought near to the light cone of a burning candle, or gas flame, or any other flame, a loud note is suddenly heard, while previously the tone of the fork was scarcely perceptible. If the experiment is made with a strongly burning gas flame, the note obtained is, at least, as strong as if the foot of the fook had been set on the sounding board of a stringed instrument. The strongest tone is obtained by bringing the flames between the tines of the tuning fork. By turning the fork around its longer axis while near the flame, four points in its revolution will be found where a diminution of the sound takes place, and where it entirely ceases, at points where interference takes place, annihilating the sound waves. If the flame flickers during the experiment, the ear is able at once to detect it by the oscillating fluctuations of the tone, which disappear on bringing the fork near the lower and more steady portion of the flame. There can be no doubt that this strengthening of the tone of the tuning-fork is due to resonance, and that the whole phenomenon is very nearly related to that of sensitive flames. In the case of sensitive flames, as well as in the above phenomenon, it is the vibration of the air caused by combustion, which, in the one case, accommodate themselves to

the vibrations of the column of air enclosed by the glass tube; in the other case to the vibrations caused by the tines of the tuning fork, and give out loud simultaneous tones. The only difference in the two cases is, that in the sensitive flame, the flame itself furnishes the force which produces the waves of sound, while the tube rather plays the part of resounder: while in the other case, the fork produces the tune, and the flame only produces the resonance.

If a vibrating fork is brought near a jet of uninflammable gas, no resonance is perceived, which proves that the fork does not select its corresponding wave from those produced by the friction of the gas against the opening in the burner, and rendered perceptible to the ear as a gentle buzz, but that it is produced by the flame itself. This was, however, sufficiently proved by the circumstance that the experiment succeeded equally as well with the flame of an ordinary candle as with that of a gas flame.—*Journal Applied Chemistry.*

Coal in England.

The land owners of Mid-England have been thrown into ecstacies by discovering veins of coal-iron. During the early part of the century the North of England was the only important coal field. Then the Staffordshire (midland) fields began to grow in importance. Coal is now worked over a large part of that county. In 1867 there were 117 collieries in operation in the north of that county, and 572 in South Staffordshire and Worcestershire. In that year these mines produced thirteen million tons. In South Wales the increase in the production of coal has been yet more remarkable. Up to the beginning of this century, a Welsh Squire was another name for a poor gentleman. It means something very different now. Coal "has changed all that." There are numbers of proprietors in Glamorganshire, especially, whose land has quintupled in value since 1825. That county now swarms with rich men. Nearly its whole surface rests upon coal strata, and mines are worked almost everywhere. There are now more than 250 collieries against 67 in 1856. It has been the abundant supply of coal and iron lying adjacent, in this county, that has made the Marquis of Bute, its principal land-owner, a millionaire. In 1866 368,692 tons of iron were raised here. At the Dowlais works there were in operation the same year 10 blast furnaces, 150 puddling furnaces and 13 rolling mills.

The most notable coal and iron finds of recent years have been in the midland counties of Nottingham and Northamptonshire. The yields in the former county have increased enormously since 1860. At the end of 1867 there were 24 collieries in operation, and the quantity obtained was 1,575,000 tons. In some places the fortunate owners have been literally "coaled out" of their ancient manor-houses, being compelled to abandon what becomes the centre of a mining district. This happened to Lord Dartmouth, in Staffordshire, and seems likely to be the fate of many owners of great places. At Lambton Castle, the residence of Lord Durham, the foundations have been built up beneath with solid masonry, at an immense expense. Lord Fitzwilliam's magnificent seat near Rotheram, in Yorkshire, and Lord Mexborough's, near Leeds, have become the centres of a colliery system, and will probably, in another quarter of a century, be in anything but an agreeable neighborhood.

Quite recently a new coal field has been opened in Nottinghamshire, about four miles from the great manufacturing borough of Nottingham. The late Sir Robert Clifton, in defiance of all leading mineralogical engineers, opened a shaft which is now yielding six hundred tons a day, and a shaft at Hucknall Torkard—in whose little tumble-down church Byron's remains rest—sends up double that quantity daily. With such encouragement, it is not wonderful that Nottinghamshire land-owners are seized with a shaft-sinking mania. Meanwhile, we hope that neither tall chimneys nor indications of "puddling" will arise within view of Newstead Abbey. The present generation, at all events, need have no anxiety about the supply of coal, for it is pretty obvious that if one door shuts, another opens.—*N. Y. Times.*

Chemical Repertory,

No. 71.—July 2, 1872.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

346. Boiler Explosions.—The *American Artiza* thus sensibly commences an article on this subject:

"To reach the point where we discover that we know nothing, is to come to the starting point of real knowledge upon any subject. Before coming to this conclusion, which is the threshold of learning, we generally do a great deal of theorizing. This is well, since by putting our theories to the test we usually find them so worthless that we abandon them, and return to the true scientific method, humbly acknowledging our ignorance. This is precisely the present scientific status in regard to boiler explosions. To say that we know boilers burst from overpressure amounts to nothing, since cylinders of hydraulic presses, cannons, air-bubbles, and even Wall street bubbles, do the same. Overpressure is only the immediate cause. Science is never content with immediate causes. What causes the overpressure? A supply greater than the demand, will be the ready answer of many. But this will not satisfy. How is it that boilers burst, under circumstances carefully arranged to prevent excessive accumulation of steam? How about the anomalies? Will any one have the hardihood to say there are no anomalous explosions? To such we say you have not yet attained to the threshold of knowledge."

347. Meat Preservation.—A correspondent of the London *Mechanics' Magazine* writes:

"During the last three summers, I managed to preserve every kind of meat by immersing it, for 15 minutes, in a solution of the genuine "extract of liquorice," heated to 160 deg., and then drying it in a chamber heated to 104 deg. These meats kept well, exposed to all weathers, both indoors and in the open air, for five weeks; but I recommend to all persons wishing to make the experiment, in Australia, etc., to choose the cool months, and after the drying process, to pack the meat either in tins, sawdust, or in straw. I may state that the liquorice communicates no flavor or peculiar taste to the meat, and that the external, and not the internal parts are slightly discolored only. Our friends in Australia will not succeed unless they use the pure extract, as this drug is greatly adulterated with ochre, starch, sugar, and many other injurious ingredients. I am, sir, yours, etc., James Bruce (late 33rd Regiment).

P.S.—Some kinds of fish admit of being kept for weeks by the above method. April 8, 1872."

348. Words to the Wise.—Nothing is more common than for gutters in back yards and on the roofs of sheds, connected even with houses of the most respectable class, to become choked with rubbish and so retain water until it stagnates. From each small cosy gutter of this kind, malaria enough for one family and mosquitoes enough for ten, will arise when the hot weather sets in.—*Daily Paper.*

349. Wood Preservation.—In a recent paper before the New York Society of Practical Engineering, Mr. R. H. Buell said:

"Dr. Boucherie turned his attention to the means of preserving the flexibility and elasticity of the material. Generally speaking, these qualities of wood depend upon the amount of moisture it contains, and it has been observed that, in the more advanced stages of the process of air-seasoning, the liability to crack is greatly increased. This suggested the introduction of a deliquescent salt, after expelling the albuminous matter of the sap, and a cheap material was found in the mother-waters of salt marshes, which contain deliquescent chlorides. This experiment proved very successful. Some pyrolignite of iron was also added to protect the woody fiber from the action of any albumen that might remain in the sap vessels. This treatment rendered the wood much less inflammable, as shown by experiment.

[All of which is very correct, but what we wish is to take the opportunity to demur to the use, so often advocated, of preparations of *iron*, in any shape or form whatever, in wood preservation. Our own conclusions, both from science and experience, are that no agents are more surely detrimental to wood.—Ed.]

350 (?)—Though we find the following in our valued contemporary, the *Scientific Press*, we beg to demur. The tale is of ventilation of bedrooms:

"The deadly carbonic acid gas which comes from the lungs at every outbreathing of the sleeper, rises to the ceiling in warm weather, but falls to the floor when the room is freezing cold. Hence, in summer, the purest and coolest air in a room is near the floor, in winter the foulest.

[Carbonic acid, strange as it may appear to some, is so far from being "deadly," that we scarce deem it to be a "poison" at all. As to that contained in the expired breath falling to the floor in winter, it is wholly incredible.—Ed.]

351. Preserve the Forests.—The views of Leatherstocking are soon to be vindicated. We clip the following on this head:

"In Russia, the forests are beginning to disappear, and a law is now in force making it illegal to use anything but coal for fuel on the railroads. The timber lands of Germany are under the special protection of the government, while in Japan every one who cuts down a tree is compelled at once to plant another.

The experience of these countries foreshadows that of our own. Thoughtless men and reckless corporations may go on stripping the land of its forests, but at last every one will be convinced of the necessity of a change."

352. Gas and Gunpowder.—In order to insure the safety, as far as possible, of the gunpowder works at the Royal Arsenal, Woolwich, England, the gas-lamps are in future to be lighted by means of electricity. This process has already been adopted at the cannon cartridge factories and several other workshops, where the quantity of explosive material is necessarily large, and it is understood to be intended to apply this system to all the buildings in the Royal Arsenal where work of a similar nature is carried on. The whole of the lamps by which these workshops are lighted are invariably fixed outside the windows, and open only on the outside of the building; but it has been thought that lighting them by the ordinary means is nevertheless attended with danger, and their ignition by wires in connection with a galvanic battery will be the means of insuring greater security against accidents.

353. The Indiana "Block Coal."—Prof. Cox, the Indiana geologist, estimates as follows:

In the block-coal zone of Indiana there are eight seams of non-caking coal, four of which are of good workable thickness over a portion of the field, having together a maximum thickness of fifteen feet, which, by including the other four seams, adds six feet more making a total of twenty-one feet of block coal. Taking one-half of this as a moderate average over the 288,000 acres comprised within this zone, it will give 5,269,017,600 tons of coal adapted to the smelting of iron, which will produce at the rate of $2.25 per ton—the average price of this coal at Brazil, Ind., the sum of $11,855,289,600.

354. Carpeted Floors.—When a carpet is taken up to be cleansed, the floor beneath is generally much covered with dust. This dust is very fine and dry, and poisonous to the lungs. Before removing it sprinkle the floor with very dilute carbolic acid, to kill any poisonous germs that may be present and to thoroughly disinfect the floor and render it sweet.—*Jour. of the Farm.*

355. To Protect Walks from Weeds.—Take one gallon of gas-tar and about half a pound of air-slacked lime, boil and incorporate them well together, and apply the mixture with a common long-handled whitewash brush. This will dry in a few hours if put in boiling hot, and will kill off all young weeds and prevent their growth.—*Am. Artisan.*

356. Oil of Peppermint.—A writer in the *American Journal of Pharmacy* asserts that commercial oil of peppermint is adulterated to the extent of thirty to forty per cent., with castor oil and alcohol.

357. Arresting Fermentation.—In a letter from Dr. Baker to Surgeon Wells, of the U. S. Navy, published in the *Journal of Materia Medica*, he says, "Catalysis may be illustrated in a comprehensive

manner, by what occurs in distilleries, where it is desirable to arrest fermentation in the 'fermenting tuns' before it reaches the lactic and acetic stages. If a few drops of tallow, from a candle, in a melted state, be dropped into fermenting 'wort,' the fermentation immediately ceases, notwithstanding many thousand gallons are acted upon."

358. Truly a Great Bore.—*Engineering* states that the deepest bore-hole which was ever sunk is 24 miles south of Berlin, near the village of Sperenberg, where a small hill, composed of gypsum, crops out in the diluvial plain of Brandenburg. The presence of gypsum so near the capital caused caused the Prussian mining authorities to search there for rock salt; and in 1867 a bore-hole 15½ inches in diameter was begun, which in 1871 had reached a depth of 4,710 English feet from the surface, which is the greatest depth that has ever yet been reached. When boring ceased the chisel stood still in solid rock-salt, so that the salt deposit which was discovered there had the enormous thickness of over 3,768 ft. Rhenish.

359. Gas-Lamps for Ventilating Sewers.—The Police Commissioners of Glasgow, under the direction of Dr. Wallace, analytical chemist, have been experimenting upon gas-lamps as a means of ventilating street sewers. Dr. Wallace says

"Eight small cockspur jets of gas are made to burn in the air drawn from the sewer itself, thus forcing a current, and any air that is not consumed in burning the gas is brought into such close contact with the flame that it must be heated to about 400° or 500°, thus ensuring the destruction of any deleterious or offensive exhalations."

360. Sulphuric Acid in Vinegar.—In consequence of the presence of sulphates, *free* sulphuric acid is not easy to determine or even to detect in minute quantities. J. T. King, in the *American Journal of Pharmacy* gives the following method, which he says will detect a 500th part:

"An ounce of the vinegar to be examined is, by evaporation upon a water-bath, reduced to about half a drachm, or the consistency of a thin extract; when quite cold, half a fluid ounce of strong alcohol is added, and thoroughly incorporated; the free sulphuric acid will be taken up by the alcohol, to the exclusion of any sulphates; the alcoholic liquid solution should stand for several hours, and then be filtered; add to the filtrate one fluid ounce of pure distilled water, and evaporate the alcohol off next by the application of a gentle heat; the remaining liquid is again left standing for several hours, and again filtered; to the filtrate, previously acidulated with a few drops of pure hydrochloric acid, a solution of chloride of barium is added, which, if sulphuric acid be present, will yield a white precipitate.

361. Hydrogen in Coke.—John Parry, of the Ebbw Vale Iron Works, says:

"It has always been a doubtful question with most chemists and metallurgists whether coal could be completely deprived by heat of its volatile constituents. The usual rule has been to expose the coal in a closed crucible to the heat of a gas or spirit blowpipe, and to assume the residue (after it had ceased to lose weight) to contain only carbon, and incombustible matter or ash.

"Nevertheless, Dr. Percy and others have called attention to the fact that coke from the hardest burnt coals, on being subjected to elementary analysis, showed a loss of carben. This loss might have been due to errors of analysis, but it was so constant that it has been generally assumed it is due to the presence of gaseous matter, by inference oxygen and nitrogen.

"The author, has, however, found that, contrary to the general opinion, coal persistently retains hydrogen, even at the highest heat at his command (a Selfstrom's furnace) he has failed to entirely free coal from volatile matter; also that all kinds cannot be deprived of their volatile constituents with equal facility by merely heating in a closed crucible."

362. Grape Gas.—In Europe the refuse of grapes, from wine manufacture, is utilized in the following manner: The refuse is first buried in a trench, covered with boards, on which stones are laid. After some time the must is taken up and treated with boiling water, which extracts almost all the argol—crude tartar, which will not dissolve in wine—in the must. The press cake is then dried and placed in the retort for gas making. The gas evolved is said to give a higher illuminating power than ordinary coal gas, while the coke, quenched with water, may be used as a coal for filtering or to prepare "Frankfort black." The water used for quenching the coke may be evaporated, and from it a good quality of potash obtained. To prepare the "Frankfort black" the coke is treated with cold concentrated hydrochloric acid, and then washed with water. The substances thus dissolved out of it form an exceedingly rich fertilizing material. —*Scientific Press.*

363. Phosphorus in Coal.—On this subject the following discussion, at the late session of the American Institute of Mining Engineers, has interest:

"Mr. Coxe thought that new analyses of the anthracites are necessary to determine whether they have phosphorus. Our analyses are all old; and were made by old methods of analysis, and before the questions of the present day had acquired their importance.

"Dr, Hunt—There is probably no phosphorus in anthracite or bituminous coals, because there is nothing to retain the phosphorus. The white ash coals have had their iron eliminated by solution, and as iron phosphide is very soluble, these coals at least bid fair to be free from this impurity.

"Mr. Britton said that phosphorus had been found in the ashes of Ohio coals."

364. A Common Case.—Dyers, like other people, have their prejudices which are often foolish, as the following will show: A manufacturer purchased a cask of American soda, made at Natrona, Pa. The dyer declared after using it, that it was impossible to get good results with it; the only thing that would do was a certain brand of an English firm, which he had used all his life. The manufacturer was anxious to give the American article a fair trial, and therefore agreed with the dealer, without the knowledge of the dyer, to return the soda, which was then re-packed in barrels bearing the English brand, and sent back to the mill. The dyer now approved the article highly, and is using it still, under the impression that it is an English article. He has no fault to find with it, to the great amusement of the parties in the secret.—*Dr. Walz, in Manufacturer's Review.*

365. Scarcity of Coal in England.—A correspondent of *Engineering* writes from the North of England: "Almost any price can be had for coals by those who are fortunate enough to have any for sale. The demand is so heavy that the additions which are being made to pits, and the new pits which are being sunk, seem to go but a very little way in meeting the extra requirements of consumers. Everybody is crying out for more fuel, and, do what they will, they cannot get it quick enough. To meet this extraordinarily increasing demand, hand labor is inadequate. Good coal-cutting machines must be forthcoming. The attention of a great many engineers is directed to this question of coal-cutting, and, in this age of invention, it will be remarkable if suitable machines are not soon introduced. Unless machines are applied to coal-cutting, there is not the slightest doubt that the iron trade and other industries will be crippled in their development for want of fuel. Coal being scarcer, there is, of course, the greatest difficulty in obtaining coke.—*Coal and Iron Record.*

366. Fermentation and Pressure.—H. T. Brown found that during the alcoholic fermentation of grape juice or maltwort, besides carbonic acid, nitrogen, hydrogen, a hydrocarbon of the paraffine group, and sometimes nitric oxide, are evolved; moreover, the proportion of the gases unabsorbed by potash is largely increased when the operation is carried on under diminished pressure. At the ordinary pressure, by far the larger proportion of these gases is nitrogen (70 to 90 per cent). but under diminished pressure, 400 to 450 m.m., the hydrogen preponderates (60 to 90 per cent). Nitrogen, however, does not occur when the solutions contain no albumenoids, even if ammonium salts are present in considerable quantity. The increase of the proportion of hydrogen, resulting from diminution of the pressure, is accompanied by formation of a comparatively large amount of acetic acid and aldehyde, so that it would seem that water is decomposed during the alcoholic fermentation, and that this result is facilitated by the diminution of the pressure. The presence of nitric oxide in the evolved gases was found to due to the reduction of nitrates originally present in the solutions.—*Lond. Chem. Society.*

367. Solution of Shellac in Water!—Doctor Walz has found, and describes in his *Manufacturer's Review*, a mode of making a neutral aqueous solution of shellac:

"The shellac is broken up, covered with a concentrated solution of carbonate of ammonia, which may be had of dealers in drugs, and boiled, preferably on a water bath, till the ammoniacal smell has disappeared. Fresh solution is added, and the boiling continued till the shellac forms a coherent, somewhat sponge-like mass. After all the carbonate of ammonia is expelled by boiling, this mass is readily dissolved by pouring hot water over it. A kind of wax or soap will generally be found floating on the surface after cooling, from which the solution may be separated by straining. This solution, brought on paper, cloth, etc., dries rapidly, and leaves a thin, coherent, lustrous and firmly adhering film of shellac. Such a solution, of course, cannot harm the fibre; but as it is generally colored even when bleached shellac is used, it will probably not be applicable to light colors."

The Gas Strike.

A little more than a week ago the employees of the Metropolitan Gas Company were given the eight-hour system, with no reduction of wages. The men had hitherto worked twelve hours, one gang during the day, and another during the night. It became necessary, consequently, to employ three gangs, working eight hours each. This concession, it was thought by the company, could not fail to give satisfaction, but it seems the men grew arrogant by success. It became necessary, by reason of employing three gangs of men, for the company to put on some new men, and the old hands used every method to have them turned out. For several days the company found that their supply of gas fell short about 100,000 feet, and Superintendent Dietrich found that several of the old workmen were accustomed to shove back clinkers and cover them up with coal in the furnaces just before the new men came on, in order to get them discharged for bad work. The offending men were discharged on Sunday and paid off. The entire gang of men immediately left their work and refused to do anything unless the men were reinstated. This demand was refused, and the twelve-hour system was restored with twenty-five per cent advance in wages. The superintendent refuses to allow any of the strikers to return to work, and claims that it is impossible for him to adopt the eight-hour system. He has procured new men, and believes he will have no difficulty to keep a proper supply of gas on hand. Captain Caffrey with a large force of police were present, to prevent a disturbance, and a strong guard was kept around the works on Monday night.—*N. Y. Times, June 25.*

Underground Temperature.

Late observations, embodied in a report to the British Association, confirm the results of former investigations touching the rate of increase of temperature with increasing depth. The average appears to be about one degree of Fahrenheit to every fifty-four feet of depth; though in some localities the increase is much more, and in others much less rapid. In the Mont Cenis tunnel, for example, at a point directly under the summit of the mountain, which is quite a mile overhead, the temperature was found to be 85.1 deg. Fahr. The mean annual temperature of the crest, as estimated from a comparison of observed temperatures at both higher and lower levels, is 27.3 deg. Fahr. Assuming this estimate to be correct, the increase of temperature downwards is at the rate of 1 deg Fah. in 93 feet, which, by applying a conjectural correction for the convexity of the surface, is reduced to about 1 deg. Fah. in 81 feet as the corresponding rate under a level surface; and this is about the rate at the Dunkinfield colliery in England, though much lower than the average elsewhere observed.

A more rapid increase than the average given above has been observed at Yakutsk, in Siberia, where, according to Middendorf, the temperature runs up at the rate of 1 deg. Fah. in 49 feet of descent. Dana mentions that Magnus found in the same locality a gain of 15 deg. Fah. in descending 408 feet, which is equal to 1 deg. for 28 feet. It is stated on the autho-

rity of General Helmersen, of the Mining College of St. Petersburg, that in sinking a well to the depth of 540 feet at Yakutsk, the soil was found to be frozen the entire distance, and the probabilities were that the frost had reached a depth of 790 feet. One degree of increase in 52 feet of descent was the rate in this well.

It is found that the rise in temperature as the thermometer descends is not always regular, being more rapid at some depths than at others. Thus, in the examination of Shergin's shaft, in Siberia, between the depths of 150 to 200 feet, the temperature rose at the rate of 1 deg. in 20 feet, while between 250 and 300 feet the increase was at the rate of 1 deg. in 96 feet. A similar though less marked difference, has been observed in the Kentish Town well in England. Between the depths of 525 and 910 feet, the rate of advance in temperature is 1 deg. in 56 feet, and from 910 to 1,100, 1 deg. in 54 feet. The strata differ materially in the two spaces, in the upper space consisting mainly of chalk and marl, and in the lower space of sand and clay; whence it has been suggested that the irregularity of the rise in temperature was due to the varying character of the strata traversed.—*Scientific Press.*

Purification of Air.

Dr. Letheby, "Medical Officer of Health for the City of London," has the following upon the ventilation of sewers and the purifying of air by the use of charcoal:

"In the case of sewers, let them be ventilated as they may, either by open gratings in the street, or by connections with rain-water pipes, or the pillars of gas-lamps, or by tubes from the drains of every house, or by special shafts in the public streets, we have but to place a small box of wood charcoal in the course of the outlet draught, and the purification of the air will be complete. As far as we know, the strength and endurance of this power are almost unlimited, so that, when once the charcoal air-filter has been set up, it will last continuously for years. These suggestions were at once adopted by the Commissioners of Sewers, and the engineer, Mr. Haywood, was instructed to report on the practical means of putting them into operation. A large district of the city was therefore selected for the purpose, and Mr. Haywood designed the plan of giving efficacy to the experiment. The district comprised a space of about fifty-nine acres in the worst part of the city. It is bounded by Bishopsgate street on the west, from Cornhill to Widegate street; by Whitechapel on the east, from Middlesex street to Somerset street; and thence along the Minories and Leadenhall street to Cornhill on the south. In this space there are about 14,000 inhabitants, living in about 1,700 houses. The total length of sewers is about 25,587 feet, and along these there are 104 air-shafts, 265 gullies, 15 flushing-shafts, 4 tanks, and 26 side entrances. This district was selected for various reasons: 1st. Because the sewers have but a slight fall and the currents in them are sluggish. 2nd. The area is densely populated and has more than an average proportion of poor in it. 3rd. The thoroughfares are mostly narrow, and are, therefore, disagreeably affected by the sewer gases which issue from the ventilators. 4th. The district affords comparatively good means of isolation from the sewers. Each of the 104 air-shafts was provided with a charcoal ventilator, an iron box about 18 inches deep and 14 inches square, containing a movable frame of six trays or sieves, upon each of which a layer of wood charcoal, in pieces as large as filberts, was placed to the depth of two inches. The experiment was commenced in the month of July, 1860, and it has been successfully continued to the present time, for, to use the words of our conjoint report on the subject, 'the deodorizing power of the charcoal has been satisfactorily proved to be complete. Not only have there been no complaints from the public of stenches from the ventilating openings, but we have ascertained by actual observation that the odor of the sewer gases is not perceptible when they have traversed the charcoal. This, indeed, might have been predicted from the extensive laboratory experiments and the other practical inquiries to which we have alluded.' Charcoal from the ventilators has been submitted to chemical examination by me after having been in action for from nine to twenty months, and when heated with water it yields abundance of alkaline nitrate, showing that some of the organic miasmata have undergone complete oxydation. But besides these compounds others are present in the charcoal—namely, peculiar alkaline salts, which indicate the fixation not only of ammonia, but also of other volatile nitrogenous bodies which are peculiar to animal decomposition. Our general conclusions from these experiments were thus expressed:

"'That dry charcoal in the presence of atmospheric air is a powerful means of destroying the mephitic gases and vapors of sewers and house drains; that the charcoal air-filters may be used with efficacy in the course of the air channels from the drains and closets of houses, as well as in the ventilation of the public sewers; that, in applying the charcoal, those contrivances should be used which offer the least resistance to the free passage of air through the charcoal; that the situation of the filter is best when the charcoal is protected from wet and from dirt, and is easily accessible; and that, from the ascertained efficacy of charcoal in destroying the dangerous emanations from sewers, the system may be generally applied with great advantage.'"

Mineral Resources of North Carolina.

By F. A. Genth.

[From the Journal of the Franklin Institute.]

[From this valuable memoir of Dr. Genth, we extract some paragraphs relating to the North Carolina coal.]

The great abundance of iron ores in North Carolina requires for their reduction a large amount of fuel, and the question of its supply has for a time given a great deal of anxiety to those who are most largely interested in the manufacture of iron, as under the present system of forest destruction, instead of cultivation, the manufacture of charcoal iron must eventually be abandoned, although this may not take place for hundreds of years yet to come. It is therefore of the greatest importance, that North Carolina contains several kinds of coal, some of which are of excellent quality, and in the immediate neighborhood or within a short distance only of the most valuable iron ore deposits.

I have already stated that the North Carolina coal does not belong to the so-called Carboniferous period, but to the Triassic; it is of the same age as the coal near Richmond, Va.

In Chatham and Moore counties is the south-eastern extension, generally called the Deep River coal field, in Rockingham and Stokes counties the north-western of the same beds, or the Dan River coal fields. The centre is washed away.

From the investigations of Prof. Emmons and Admiral Wilkes, we learn that the Deep River coal is of the best quality, well adapted for the manufacture of iron and gas, and can be obtained in inexhaustible quantities.

The area underlaid by coal is over forty square miles, containing over 6,000,000 tons of coal to each square mile. The coal measures consist of strata of slates, calcarous shales, alternating with beds of argillaceous carbonate of iron and seams of coal, all inclosed between two beds of red sandstone.

Five seams of coal have been observed; the upper consists of a bed of six and a half feet in thickness, separated by a seam of black band. Near the outcrop it is somewhat contaminated with sulphur, which diminishes, however, as the depth increases. There are several varieties of coal, the highly bituminous and semi-bituminous; near a trapdyke it has lost almost the whole of its volatile matter, and has become an anthracite. According to an analysis of coal from the deep pit in Egypt, by Dr. Jackson, it contains:

Fixed carbon	= 63.6
Vol. matter	= 34.8
Ash	= 1.0

An analysis of Egypt coal, which I have lately made, gave:

Moisture	= 0.84
Vol. matter	= 25.75
Fixed carbon	= 63.27
Ash	= 10.14
	100.00 per cent.

It contained 1.35 per cent. of sulphur.

An analysis of coal from the Gulf gave me:

Moisture	= 1.16
Vol. matter	= 21.90
Fixed carbon	= 70.48
Ash	= 6.46
	100.00

Sulphur only 1.02 per cent.

All these analyses show the great value of the Deep River coal.

The Dan River coal field embraces an area of over thirty square miles; it has hardly been developed. Small quantities have been mined near Madison, Rockingham county, which were used by the blacksmith in the neighborhood; and the North Carolina Centre Iron and Manufacturing Company, of this city. has made a few trial pits which have proved the existence of five beds of coal, although it is probable there are others besides.

The coals which I have examined from two of the seams near the outcrop gave respectively, 11.44—13.66 per cent. of ash, 75.96 and 76.56 per cent. of fixed carbon and about 12 per cent. of volatile matter. These results are very encouraging. The Dan River coal field being the north-west continuation of the Deep River, has probably the same seams, and where the coal is undisturbed, the same quality of coal. These coal fields are not only of general value, but, when it is remembered that they lie in close proximity to some of the largest and best iron beds in the State, their importance can then be fully appreciated.

Petroleum in the Eastern Hemisphere.

[The following is from a work entitled "Eighty Years of Progress," by the late lamented geologist, James T. Hodge, who was lost a few months since, with one of the lake steamers.]

"The occurrence of an oily fluid oozing in some regions from the surface of the earth, coming out with the springs of water and forming a layer upon its surface, has been noticed from ancient times, and the oil has been collected by excavating pits and canals, and also by sinking deep wells. Bakon, a town on the west side of the Caspian Sea in Georgia, has long been celebrated for its springs of a very pure variety of petroleum or naphtha, and the annual value of this product, according to M. Abich, is about 3,000,000 francs, and might easily be made as large again. Over a tract about 25 miles long and half a mile wide, the strata, which are chiefly argillaceous sandstones of loose texture, belonging to the medial tertiary formation, are saturated with the oil, and hold it like a sponge. To collect it, large open wells are sunk to the depth of 16 to 20 feet, and in these the oil gathers and is occasionally taken out. That obtained near the center of the tract is clear, slightly yellow, like Sauterne wine, and as pure as distilled oil. Toward the margins of the tract the oil is more colored, first a yellowish green, then reddish brown. In the environs of Bakou are hills of volcanic rocks through which bituminous springs flow out. Jets of carburetted hydrogen are common in the district, and salt, which is almost always found with petroleum springs, abounds in the neighborhood.

"Another famous locality of natural oils is in Burmah, on the banks of the Irrawaddy, near Prome. Fifty years ago, it was reported there were about 520 wells in this region, and the oil from them was used for the supply of the whole empire and many parts of India. The town of Rainanghong is the center of the oil district, and its inhabitants are chiefly employed in manufacturing earthen jars for the oil, immense numbers of which are stacked in pyramids outside the town, like shot in an arsenal The formation containing the oil consists of sandy clays resting on sand stones and slates. The lowest bed reached by the open wells, which are sometimes 60 feet deep, is a pale blue argillaceous slate, Under this is said to be coal (Tertiary?) The oil drips from the slates into the wells, and is collected as at Bakou. The annual product (1861) is variously stated at 412,000 hogsheads, and at 8,000,000 pounds.

"The Burmese petroleum has recently (1861) been imported into Great Britain, and is employed at the great candle manufactory of Messrs. Price & Co., at Belmont and Sherwood. It is described as a semi-fluid naphtha, about the consistence of goose grease, of a greenish brown color, and a peculiar but not disagreeable odor. It is used by the natives, in the condition in which they obtain it, as a lump fuel, as a preservative of timber against insects, and as a medicine. It is imported in hermetically closed metallic tanks, to prevent the loss of any of its constituents by evaporation. At the works, it is distilled first with steam under ordinary pressure, and then by steam at successively increasing temperatures, with the following results:

Temp. Fahr.	Proportional product.	Character of product.
Below 212°	11	Mixture of fluid hydrocarbons free from paraffine.
230° to 293°	10	Mixture of fluid hydrocarbons containing a little paraffine.
293° to 320°	...	Distillate very small in quantity.
320° to 612°	20	Containing paraffine, but still fluid at 32°.
About 612°	31	Product which solidifies on cooling, and may be submitted to pressure.
Above 612°	21	Fluids with much paraffine.
	3	Pitchy matters.
	4	Residue of coke, and a little earthy matter in the still.

"Nearly all the paraffine may be separated from the distillates by exposing these to freezing mixtures; and the total product of this solid hydrocarbon is estimated at 10 or 11 per cent.

"Many other localities might be named which furnish the natural oils upon a less extensive scale, as in Italy, France, and Switzerland. In Cuba and in South America, impure varieties of bitumen are met with, flowing up through fissures in the rocks, and spreading over the surface, in a tarry incrustation which sometimes solidifies on cooling."

Aniline Colors.

A Lecture delivered to the American Institute.

By Prof. C. F. Chandler.

It is well understood that coal is an element of our national wealth; and that we derive from it our power. The combustion of 300 lbs. of coal under a steam boiler will produce a power equal to the mechanical force exerted by a man for a year. Another important application of bituminous coal, is to the manufacture of illuminating gas. In this manufacture there are certain residual products, which were at first thrown away; and it is of these that I propose to speak to-night.

Coal tar is produced at the rate of about ten gallons to the ton of coal. Thousands upon thousands of barrels of coal tar were at first thrown away; but when the chemist turned his attention to this substance, he discovered so many products useful in the arts which could be made from it, that coal tar now finds a ready market at $1.50 per barrel. When coal tar is subjected to distillation, the liquid portion passes off, and there remains the heavy black pitch which is used for roofing and for pavements. The liquid portion, which comprises about one-fourth of the original coal tar, produces first a light fluid called naphtha, and then a heavy liquid which is called dead oil. The light liquid is a mixture of carbon and hydrogen, of which benzole is the type. It is C12 H6; that is, taking into account the difference of weight, 72 parts of carbon to 6 parts of hydrogen. Other substances are produced from this differing by two atoms of each, making C14H8, C16H10, C18H12, C20 H14, etc.; but, until recently only the first two of these have had any practical importance in the arts. They were used simply as fuel, and as antiseptics, for preserving timber from decay. But lately one of them is claimed to be a specific for the smallpox.

After the volatile portions have been removed, there remains this dead oil, which is heavier than water. This was for a long time used as fuel in glass houses. It was then found that the carbolic acid it contains was a most powerful disinfectant and antiseptic. It was found that it would prevent the spread of the cattle disease; that cattle having the disease in its worst form might be placed with others with safety, if they were protected by this acid. It was found too that the durability of timber was increased four or five fold by its application.

But I wish to-night to invite your special attention to the beautiful colors which have recently been obtained from refuse coal tar. They are naturally subdivided into three groups, the aniline colors, those derived from naphthaline, and the carbolic acid colors. I shall confine my attention wholly to the chemical phase of the subject.

Benzole is a hydrocarbon. Bringing that in contact with nitric acid, an atom of nitrogen carries off an atom of hydrogen; and we have nitrobenzole, which is a very fragrant oil, an artificial oil of bitter almonds, used instead of that substance in the manufacture of soaps. When the nitrobenzole is made to give up its oxygen and take up hydrogen, it becomes aniline.

Nitrogen is a Protean element, which gives rise to a great variety of compounds. Ammonia, is NH3, and these three atoms of hydrogen can be replaced by a great variety of substances. Aniline is a similar substance. It is ammonia, replacing one atom of hydrogen by phenyl, which is C12H5. There is no limit to the number of compounds that may be developed on this type; and it opens one of the most important fields of chemical investigation at the present day. All the aniline colors are derived from N3 H9, converted by the process of substitution into new compounds. The first investigation in this direction, which however did not result in any practical product, was that of a German chemist, who found that by treating aniline with chloride of lime, he produced a violet or purple tint. Perkins, who was the first successful manufacturer of color from coal-tar, manufactured a substance to which he gave the name of mauve. Then came the discovery of the rosaniline, which is produced from commercial aniline, pure aniline not answering the purpose. Subjecting commercial aniline to the action of nitric acid, and then to the action of nascent hydrogen, we obtain rose aniline, which is C40 H19 N3. The chloride, hydrochlorate, arseniate, acetate, nitrate, and other salts of this substance produce the beautiful tints, of which I have specimens here. Hoffman found that he could change this beautiful red tint of the rosaniline to various shades of violet, by simply boiling it with more aniline. This introduced more phenyl in the place of hydrogen. One atom made it purple, another more bluish, and a third atom of phenyl made it the most beautiful blue that has ever been manufactured.

Replacing the hydrogen with ethyl C4H5, or with methyl, C2H3, we obtain still further colors. In every case the beautiful rose red becomes more and more purple, until the substitution of the last atom of hydrogen converts it into a deep and perfect blue. On carrying the investigation further it was found that by proper treatment the blue color could be converted into a green, by using ethyl and methyl. Subsequent treatment developed an entirely different base, having the form C40 H17 O3, with yellow tints; and further treatment produced a brown and finally a black; so that the most durable black for calico printing is now obtained from aniline.

From the coal tar obtained from a ton of coal, three fourths of this beautiful color are produced. The coal, which is worth about $6, produces the gas, the coke, the ammoniacal water, largely used for agricultural purposes, the carbolic acid, used for the preservation of timber and as a disinfectant, and finally this beautiful color, which alone is worth nearly as much as the coal originally cost. The amount of this industry has become so enormous that at present five tons of this raw aniline oil are manufactured daily, on the continent alone, and 90,000 lbs. of iodine are used in effecting the substitution; and yet it is an industry which has started since 1860.

A word with regard to the carbolic acid colors. The carbolic acid is obtained by treating the dead oil with an alkali. This furnishes a number of coloring matters. Carbolic acid is C12 H6 O2; or it is the oxyd of benzoyle, which is C12 H6. Treating carbolic acid with nitric acid, we produce C12 H3(NO4)3 O2. Picric acid is a substantive dye for silk and wool, uniting with them without any mordant. Treating picric acid with the cyanide of potassium, an acid is produced which gives beautiful garnet colors on silk and wool. By treating carbolic acid with soda and the oxyd of mercury, it is converted into rosolic acid, which produces various shades of orange, and is used for coloring house paper. Treating this with ammonia, it produces a scarlet tint. The intimate connection existing between the rosolic acid and the aniline colors, is shown by the fact that by treating rosaniline in anhydrous acid, the same result is obtained. From this orange red of rosalic acid, can be produced a deep blue color by the action of aniline.

There is a series of naphthaline colors, but they are not found to be fast, and I will therefore pass them by. When coal oil is distilled, and 25 or 30 per cent. of volatile products are removed, the result is solid, and is called anthracene. Recently, from this, there has been artificially produced the coloring matter of madder. The colors from aniline had proved brilliant and durable for silk and wool, but not for cotton fabrics. It is now a question whether the colors from anthracene will supply this want; whether they will be found to be permanent. I have here specimens of calicos printed by these colors.

Heating Railway Cars.

This subject, of perennial interest as well as of continual experiment, has lately had an addition to its current history, in the adoption, at least for trial, of a new device by the Reading Railway Company. The apparatus is described as comprising a furnace, substantially the same in all essential respects as the ordinary air-heating surface, suspended underneath the car, by light iron rods. These rods are designed to give way in case the heater is brought in contact with the ground by the jumping of the track by the car, and thus disengage the otherwise incendiary appliance from its place. This, on the occasion of a recent accident, occurred, and the inventor had reason to congratulate himself on the practical success, in this respect, of his system. Provided the floor of the car be fire-proofed, so that no danger of ignition from the furnace in its normal position need be apprehended, this plan of suspending the furnace seems to possess considerable merit, and, it is quite possible, will form an integral feature of the yet-to-be-devised even approximately perfect apparatus for warming cars.

In the appliance above mentioned, the heater warms air, which is conducted by flues under each seat, and is there discharged, as in dwellings, etc., heated air is discharged through a register. No doubt this works as well as any method embracing the employment of hot air injected into and mingling with the atmosphere within the car. But scientists have demonstrated that a wide difference exists between heat thus supplied and radiant heat from a heated metallic or other surface. In the former case, the hot air, with its great avidity for moisture, abstracts it from lungs and cuticle of the passenger, and causes a fevered excitement of the system, while in the other the heat passes through the air, and, from the slight capacity of the air for absorbing heat, passes through and communicates warmth without discomfort. This should be kept in mind in all projects to secure the end under consideration; and the safe arrangement of the furnace should be combined, in all cases, with some means of warming the interior of the car by radiant instead of communicated heat.—*Amer. Artisan.*

Improved Furnace.

For reducing oxides and obtaining metals, not only iron, but potassium, sodium, and the like, an English inventor proposes to use an apparatus constructed as follows:

"The furnace is like an ordinary blast-furnace, but the top is covered in and fitted with various valved inlets or doors for the introduction of the materials. There is a central inlet for coal or carbonaceous matter, and a set of inlets round it for the ores or oxides, the silicates, aluminates, or other salts, and the lime or flux. Exhausting apparatus draw the gases out of the furnace. Only a comparatively small portion of the coal is to be introduced by the central inlet at the top, the larger portion being put into chambers or channels formed at the lower part of the furnace. Passages are formed in connection with the hearth at a suitable height for the slag to flow off by, leaving the iron in the bottom of the hearth to be withdrawn by a separate outlet; and the air supply enters by what may be termed the slag passages, and takes up heat from and so cools the slag. The air thus heated finds its way into a gallery formed round the lower part of the furnace, when it enters the interior, first passing through the coal or coke in the bottoms of the lateral coal-chambers, and thereby having its oxygen converted into carbonic oxide. The coal in the chambers becomes gradually coked through the action of portions of the hot gases resulting from the combustion in the lower part, and passing up through it, and the gases and vapors evolved from it are led by suitable passages into the interior of the furnace, to assist in reducing and heating the ores. At and above the part of the furnace where the reducing action terminates, air is admitted to complete the combustion.—*Am. Artisan.*

SUNSHINE AND SLEEP.—Sleepless people—and there are many in America—should court the sun. The very worst soporofic is laudanum, and the very best, sunshine. Therefore, it is very plain that poor sleepers should pass as many hours as possible in sunshine, and as few as possible in the shade. Many women are martyrs, and yet they do not know it. They shut the sunshine out of their houses and their hearts, they wear veils, they carry parasols, they do all possible to keep off the subtlest and yet most potent influence which is intended to give them strength and beauty and cheerfulness. Is it not time to change all this, and so get color and roses in your pale cheeks, strength in your weak backs, and courage in your timid souls? The women of America are pale and delicate; they may be blooming and strong, and the sunlight will be a potent aid in this transformation.—*Sci. Press.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

On the Weather-Waste of Coal.

MARIETTA, OHIO, June 14, 1872.

Mr. Editor: I read your Journal with much interest and profit, and among other things I *supposed* I had learned is, that all exposure of coal to the air, and especially to air, water, and sunlight, tended to reduce rapidly its value for gas or heating purposes. In your issue of May 3, in an article headed "Weather-Waste of Coal," it is said (by exposure to the weather) the gas yield in quality of coal decreased in one instance 45 per cent, and the heating power 47 per cent, whilst the same sample, under cover, lost in the same time but 24 per cent for gas purposes, and 12 per cent for fuel. Now, in a communication from Terre Haute, Ind., in your paper of June 3, is an extract from a Geological Report of the State of Illinois, which says, "For *most purposes*, all coals *improve in value* by exposure *under cover*, to a free circulation of air. Is it true that coal is *improved* for *gas purposes*, by exposure to a free circulation of *air, under cover?*

For use of our gas works we are obliged to buy coal in considerable quantities, and it is kept in a shed with projecting roof, boarded up at the sides from the ground to within four feet of the eaves; this opening being left for convenience of filling. Is our coal kept under cover in this shed as good for gas purposes. four months after, as when it is first put under cover? If not, how much does it probably lose in value in that time? Our works are small, and we have no means of testing the relative value. An answer to these questions will be of great interest to me, and may be of equal interest to many of your subscribers.

Yours respectfully,
SAMUEL SHIPMAN,
President Marietta Gas Co.

[Want of space only prevents comments on these very important queries of Mr. Shipman, whose letters, let us say, by the way, are always of practical interest. His last about tar pavements, it will be recollected, elicited from Mr. Somerville of Knoxville, highly valuable information. We hope this one will be equally fortunate, and that Mr. Shipman will continue his favors to us.—ED.]

Adjustment of Station Meters.

PORTLAND, ME., June 12th, 1872.

Mr. Editor: In your article published in the last No. of the Journal, under the head of "The Gibson Improvement: Its Present Status." You say:

* * * * * * "Averages at Cambridge by Mr. Edward Jones of the South Boston gas works—assisted by Mr. Alfred W. Norton, of the East Boston gas works, and Mr. Thos. J. Pishou, of the Roxbury gas works, Boston Highlands, in 1871,

Coal.	With dip-pipes. Feet per lb.	With retort valves. Feet per lb.
Westmoreland.....	5.11	6.28

Now Sir, this statement is too absurd for you to publish to such an intelligent class of readers as most of your subscribers are; and I doubt if there is one of them (not even excepting the above named gentleman) who is foolish enough to believe, that the Cambridge works, or any other works, ever averaged with sealed dip-pipes, 5.11 cubic feet of gas to the pound, from Westmoreland coal—even as low as twelve candle power.

Now I do not pretend to say that the station meter at the Cambridge works did not register the above named results, for it is a well known fact, to all gas engineers, that it requires but a few moments time to raise the water line of the station meter, so as to cause it to register a greater quantity than is actually made. The question is not how much gas was registered by the station meter to the pound of coal, but how much gas was realized; or, in other words, how much gas was *sold* to the pound of coal used?

It is a noticeable fact, that in many of the reports of extraordinary results, the correctness of the station meter is entirely lost sight of; and I will here call your attention to a recent case, published in your issue of the 16th of May last. I refer to an article on page 156 under the head of "Report Upon the Grand Central Hotel Gas," by William Wallace Goodwin, in which we have given as the sworn testimony of all parties concerned, even the laborers employed, as to the testing of the scales, the weighing of the coal, the register of the gas by the station, etc., etc. But observe, not one word is said about the most important of all, the testing of the *correctness* of the *station meter*, for it is well known (as I before remarked) that with the addition of a little water in the station meter, they could have as easily shown 8 cubic feet to the pound of coal.

Your readers do not care to know the quantity of gas registered by the station meter, but would feel a great interest in knowing how much gas was *sold* to the pound of coal carbonized.

I have the report of a Superintendent of a gas works before me at this time, who claims to have made an average yield last year of 4·75 cubic feet of gas to the pound of coal; but his *leakage* was 20 per cent. Now what is the difference whether he made 4·75 with 20 per cent. leakage, or whether he made 4 cubic feet to the pound of coal carbonized, with a loss by leakage of five per cent.? The result is precisely the same.

I very much doubt if there is an intelligent gas engineer who believes that his loss in gas, by leakage and condensation, is 20 per cent. (and some place theirs at a still higher figure.)

Please Mr. Editor request the gentleman of the Cambridge works to inform your readers, how much gas he sold to the pound of coal carbonized in 1871? I would like to compare notes with him.

Respectfully, WM. YORKE.

Value of Coal Calculated from Sperm Equivalent.

NEW YORK, June 25, 1872.

Mr. Editor: Your issue of 16th May contained a communication from "X," on "Practical Suggestions on Candle Power," in which he attempts to establish the relative values of gas materials by the cost of sperm equivalent. The surprising results are arrived at, and distinctly stated as practical conclusions, that Wollongong=6251 lbs. sperm, is a trifle cheaper at $30 per ton than Penn coal=554 lbs. sperm at $7.87, and that naphtha and air mixed=3,840 lbs. sperm costs as much at 10 cents per gallon of naphtha, as Penn coal at $10 per ton! The inference is also deducible from his table of comparisons that Grahamite=1,543 lbs. sperm, is worth hardly more than Penn coal=554 lbs. sperm.

The fallacy consists in establishing the cost of sperm, without taking into account the cost of production. He arrives at the "actual cost of coal" by subtracting the value of the coke from the first cost, and at the "cost of a pound of sperm" by dividing the "actual cost" by the number of pounds of sperm equivalent (only his decimals are all one-tenth of the correct result). If gas *produced itself* the method would be right. But suppose a parallel case. Assume a bushel of seed wheat to cost $2.50, and to produce 600 lbs. grain; straw worth $2. What is the cost of a pound of grain? By "X's" process: Deduct the straw from first cost=50 cents="actual cost" of a bushel of seed, which, divided by 600 gives in cents 0.08333—or less than one tenth of a cent for a pound of grain, or five cents per bushel.

Tables constructed in this way, so far from being "very interesting and useful," are absolutely false; and when used for comparison, are calculated to mislead. "X" is misled himself. It is not only not true that the cost of a pound of sperm from Penn coal is .518 of a cent (*he* has it .0518), but the *ratio of values* between that and the other materials, compared with it, is absurdly distorted, by omitting the element of cost of production.

Instance the comparison between the first two coals in his table. His result is that the cost of the sperm equivalent of Ritchie (or Grahamite) at $16, is nearly double that of Penn coal at $6.87. Now, assume *all* his data, and *also* that, in either case, the cost of labor, fuel, lime, etc., (cost of production) is $12 per ton.

Penn coal—First cost, per ton, $6.88; less coke, $4; actual cost per ton, $2.87; cost of production, $12: total cost per ton, $14·87; cost of a lb. of sperm in cents, 2.684.

Grahamite coal—First cost per ton, $16; less coke, $2; actual cost per ton, $14; cost of production, $12; total cost per ton, $26; cost of a lb. of sperm in cents, 1.685.

This reverses "X's" result, and shews that if a ton of Penn coal is worth $6.87, a ton of Grahamite coal is worth $31.42. Proof:

$$\frac{6.87 - 4 + 12}{554} = 2.684$$

$$\frac{31.42 - 2 + 12}{1543} = 2.684$$

The absurdity of the ratio of value between Penn coal and the other materials, as deduced by "X," will appear upon a similar comparison, in which the cost of production enters as a proper and necessary factor.

Y.

The Massachusetts Institute of Technology.

MONTREAL, June 20, 1872.

Mr. Editor: Permit me to correct a slight error which occurred in your kind notice of me in your Journal of June 3, where it is said that I have been appointed Professor of Geology and Mining, in the Massachusetts Institute of Technology at Boston. I have been named Professor of Geology in place of Prof. William B. Rogers, who after resigning his position as President of the Institute, retained until last year the chair of Geology. My duties there, which commence in October next, are confined to courses on general, descriptive, theoretical and American geology, with the addition of two short special courses. The one on Practical Lithology, the other on Chemical Geology.

The department of Mining remains, as before, under the direction of Prof. A. P. Rockwell, late of the Sheffield School, at New Haven, who gives a complete course on Mining-Engineering, and one on Economic Geology. A course of Paleontology is given by Professor Wyatt. Metallurgical and Technical Chemistry are taught by Prof. Ordway, Analytical Chemistry by Professor Crafts, and Mineralogy and Assaying by Professor Richards, who has charge of the very complete Metallurgical Laboratory of the Institute. This includes all the most approved ore-dressing and mill-machinery for the treatment of gold and silver ores; a 15 horse power steam engine, furnace, etc., by which the treatment of parcels of four or five hundred weight of the various ores will be conducted by the students themselves, under the direction of the professors. The above of course relates only to the special course of study for Mining and Metallurgical students in their third and fourth years.

Yours,
T. STERRY HUNT.

On Sawdust as a Purifier of Gas.

KNOXVILLE GAS WORKS,
KNOXVILLE, TENN., June 22, 1872.

Mr. Editor: In your last issue you submit certain points to your readers, suggested in a communication from Mr. J. W. Case. In answer, I would say, that I constantly use saw dust with the lime for purifying; in quantity about 20 per cent. The saw dust does not purify the gas, nor does it make the foul lime more pleasant to smell, but it is like that celebrated meter at Louisville; it performs a "double function." First, it makes the lime porous, and prevents its caking, and thereby reduces to a considerable extent the back pressure on the retorts. Second, the saw dust being thoroughly mixed and coated with the lime pre-

sents much more surface for the gas to act upon, and thereby effects at least a saving of 10 per cent. of lime. In situations where saw dust cannot be procured I have found the fine sifted breeze from the coke answer the same purpose.

Mr. Case answers his first question, when he says, "I have never taken the register of meters, but expect to do so soon."

I quite agree with your correspondent R, in his opinion of the so-called "Gibson Improvement," and it was with much pleasure that I read the concluding paragraph of your editorial, wherein you state your intention of taking leave of the subject. I trust any notice of it in future, will only be found where it ought to be—in the advertising columns.

Respectfully,

JAS. SOMERVILLE, President.

[In his allusion to the editorial, Mr. S. has mistaken, we are sorry to say, both our language (as reference to it will show), and our meaning, so far as we intended any of the latter. We could not pass over such a mistake, implying an inconsistent withdrawal on our part, from a discussion on a subject of interest to many readers, if not to all. It cannot be expected that all topics will interest all readers.—ED.]

Anticipations of Modern Chemistry.

The ancient alchemists, notwithstanding that they were always searching for unattainable results, succeeded in discovering thousands of facts which have laid the foundation for that wonderful knowledge which gives us an insight into the secret recesses of the composition of matter. It is, therefore, highly interesting to trace the slow progress of that alchemistic science, chiefly nursed by the cupidity of men who wanted nothing but the increase of their personal possessions, and who, in place of that, increased the knowledge and well-being of the human race.

The Divine Art, as the ancient alchemists called their pursuit, appears to have been practised first in Egypt, that cradle of knowledge; for historians tell us that the Emperor Diocletian, after the conquest of the rebellious Egyptians in the year 296, ordered that all the writings on the alchemy of gold should be burnt, in order that the people should not, by making gold, grow so rich as to commence a second rebellion. It was thus already known, at that time, that the success of revolutions and rebellions depends on the possession of money.

In the large European libraries, manuscripts on alchemy are preserved, many of them dating from Alexandria in the fifth century, and written by Greeks living in Egypt and practising alchemy there. It appears, further, that when the Arabs invaded the north of Africa and the south of Europe, they learnt this art from the conquered nations; and the results of their labors and their wonderful advance are recorded in the archives of the Spanish Moors. So we find that Djafar, better known under the name of Geber, who lived in the end of the eighth and the beginning of the ninth century, in Seville, Spain, and who was wise enough not to believe that any one had succeeded in making gold, discovered that a metal when calcined, which we now call oxidized, becomes heavier. It took 1,000 years to bring such facts to bear on the destruction of Stahl's theory of the Phlogiston, which taught that during this calcination, or burning of metals, something was driven out which had negative weight. Geber also was the first to make nitric acid by mixing blue vitriol, alum, and saltpeter, and distilling the mixture; he changed it into *aqua regia* by adding sal-ammoniac; then he dissolved gold in the same, and thus obtained the solution of gold, so long searched for by other alchemists and supposed to be the elixir of life which would cure all diseases and even prevent death. The experiments undoubtedly made in this direction, however, failed, of course, and the results therefore have neither been recorded nor handed down. We know now that gold is one of the most dangerous elements to introduce into the human system, because its insolubility makes its removal afterward very difficult. Geber gives very clear instructions in many chemical operations, as sublimation, distillation, filtration, water and sand baths, cupels of bone earth to absorb the metals which become calcined (oxidized), etc.; and there is no wonder that, in the middle ages, he was called the master of all masters in alchemy.

Sulphuric acid was first made in the end of the ninth century by Rhazes, head physician to the great Bagdad hospital. He made it in the same way as at present practiced to make Nordhausen vitriol, by distilling copperas. He also made absolute alcohol by distilling spirits of wine over quicklime, while phosphorus was made by Achill Bechil, who sublimed a mixture of urine, clay, lime, and charcoal; he called it an artificial carbuncle, and said it shone in the dark like the moon. This was a lost discovery, when, in 1669, Brand in Hamburg made phosphorus in a similar manner. Geber had a clear conception of the evolution and combination of gases, which he called ghosts or spirits (whence our word "gas"). This is proved by his account which, translated, runs thus: "When spirits fix themselves in solid bodies, they lose their form and are in their nature no longer what they were before. When you compel them to be disengaged again, this is what happens: Either the spirit alone escapes in the air, and the solid body remains fixed in the alembic, or the spirit and the solid body escape (volatilize) at the same time."

As a few other eminent Arabian alchemists, must be mentioned El-Raii, Ebid-Durr, and Tohagre, who wrote an alchemical poem, and Djildegi, one of whose chemical works is called "The Lantern," a very significant title for such a subject. But the most astonishing fact of all is the definition which some of these authors give of the chemical science they practiced, and which is worthy of the nineteenth century, It is: "The science of combustion, the science of weight, the science of the balance."—*Prof. Joy.*

Rotating-bar Coal Screen.

In the *Mining Journal* of April 29 last, we described an improved coal screen, the invention of Mr. G. W. Hick, of Leeds, and at the recent meeting of the Iron and Steel Institute the model of the machine attracted much attention.

It consists of one or more sets of bars mounted in a frame, and capable of rolling or performing an entire or partial revolution on their own axes. Spaces are left between the bars for the passage of such materials as are intended to pass between them, and these spaces may be regulated to accommodate the apparatus to various gauges of substances. The bars are so actuated that all composing one set shall turn in the same direction. The sets may be placed beside each other, or otherwise, and the space between the rollers of another set. One set may turn in one direction, and a parallel set in another direction, the rollers composing each set, however, turning respectively in the same direction. The substances to be treated are fed to or on the bars to which the rolling motion is communicated, and the small particles pass between the bars while the larger slide over them. The rollers may be formed in longitudinal sections, the sections of each roller turning in respectively alternate directions. The bars instead of being cylindrical may be tapering or conical. The coals or material to be treated are thrown on the dead plate, and slide thence to the upper surface of the revolving bars, where the separation is rapidly effected, the large and small repectively being received in separate trucks. The rotation of the bars renders the separation much more rapid, and in consequence of their being made to rotate all in one direction there is no tendency to crush the coal, however tender, and thus the largest possible quantity is passed as round coal. In addition to the greater expedition with which the separation is effected, the screens constructed according to this invention work with so little fall that injury from the too rapid drop of coal is likewise avoided, and there is no difficulty, by a peculiar modification of the screen, in separating the slack into smudge, smithy coal, and nuts. The screens require very little power to drive them, and altogether work most satisfactorily.—*Lon. Mining Journal.*

Burnt Iron and Steel.

W. M. Williams has given the result of some inquiries into the causes of this phenomenon, to the Chemical Society of London. After some remarks upon the physical characteristics of the damaged materials, he asserts that he has found in all the samples of iron which he has subjected to examination, particles of black oxide more or less abundantly distributed throughout the mass. These are, however, absent in burnt steel. The method which he suggests of quickly deciding this question, is to take a small quantity of fresh borings or filings, and to cover them with some diluted nitric acid. As the iron dissolves, the free oxide separates and remains suspended in the liquid, rendering it dark in color. These particles shortly disappear, and are thus to be distinguished from separated carbon. No such discoloration takes place with good irons.

The cause of the burning of iron he explains as follows: As soon as the small quantity of carbon is removed from the heated mass by oxidation, this process extends to the iron itself—not only upon the surface, but into the interior. The higher the temperature, and the longer the exposure, the greater is the quantity of carbon necessary to protect the iron; and this, in the author's opinion, is the reason of the failure to produce merchantable iron by the Bessemer process. The high temperature and great exposure of the metal in the converter to the air, causes oxidation of the iron to take place even in the presence of considerable carbon. The best iron, therefore, should be that in which carbon is brought to the lowest possible proportion, without oxidation of the iron.

Burnt steel the author considers to be steel which has, by reheating, lost some of its carbon by oxidation, and by sudden solidification has had the resulting carbonic oxide imprisoned in the interior of its mass. The well known permeability of iron for certain gases renders such a process not difficult to understand.

The structure and properties of "burnt iron and steel," are therefore "caused by the presence of intermingled particles of combustion products breaking the continuity of the metal. The carbon is burnt in the case of the burnt steel, the iron itself in the burnt iron.—*Jour. Franklin Institute.*

Illumination in Warfare.

Among the various devices employed in war is that of casting a strong light on a enemy's position at night, so as to enable a fire to be directed on to it. When it is remembered that not only may night attacks and surprises be attempted, but that in the ordinary course of things trenches are dug, saps pushed forward, and batteries armed at night, it will be seen how valuable would be a really effectual method of illuminating a distant point. Various means have been attempted to carry out this object. The first idea was to project a mass of brightly burning composition among the enemy in the form of what is termed a ground light ball; then came the conception of a light floating overhead and casting its bright beams downwards; and finally, that of a fixed light burning steadily, whose rays could be reflected by means of a parabolic mirror on to the desired spot.

Ground light balls seem to have been employed in war for centuries; it is difficult to trace their origin, from the circumstance that, light and heat being generally strongly evolved from the same compositions, illuminating and incendiary projectiles were hardly distinguished apart. In fact, the very name of "carcass," now given to the latter class, appears to have been originally the designation of the former. The present service ground light ball consist of a mass of inflammable composition made up in the form of a short cylinder with hemispherical ends within a frame of hoop iron; the composition, which consists of a mixture of sulphur, saltpeter, resin, and linseed oil, is covered with canvass, and woolded round the cylindrical part with cord; the base end in all cases (and in large calibers the front end also) is protected by an iron cup, the larger ones having also lugs in front for lifting the projectile. We have noticed that the light ball we have just described was formerly termed a carcass; to most of us the term is unmeaning enough, but it has been suggested that the oldest inhabitant may remember bodies hung in chains from the gibbets that still linger on some of our hill-sides, that bore no slight resemblance to actual carcasses, reduced by the attacks of ravens and the work of time to mere black trunks, smeared with tar and bound in iron bands, so that they swung in the breeze long enough to connect their name with an appearance very similar to that of the light ball.

Far from there being anything remarkably good about the present pattern of ground light ball, it is so faulty that the fact that it has not been improved on must be attributed to a conviction in the minds of the authorities that the day for such projectiles has gone by. Its elongated form is quite unsuited to smooth bored ordnance, for, having no rotation to steady it, turns over and over in flight and carries very inaccurately; it is fragile, and can only bear a small firing charge. The composition is by no means the one that gives the most brilliant light, and it

[*For continuation see page* 10.]

THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR---PROF. HENRY WURTZ.
Editor's Private Office, 26 Pine St., Room 36.

This is a recognized official organ of—
LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS:

NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau St
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—COE, WETHERILL & Co., Ledger Buildings, Phila.
Germany—B. WESTERMANN & Co., of New York.
Great Britain—TRUBNER & Co., 60 Paternoster Row, London.
France—LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonniere.
Brussels, Belgium—HENRI BERGE.

☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

TUESDAY, JULY 2, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article.

*Stancliff's New Patent Retort-Lid Fastenings	1
New Form of Sounding Flames	1
Coal in England	2
Chemical Excerpts	2
The Gas Strike	3
Underground Temperature	3
Purification of Air	4
Mineral Resources of North Carolina	4
Petroleum in the Eastern Hemisphere	4
Aniline Colors	5
Heating Railway Cars	5
Improved Furnace	5
CORRESPONDENCE—	
On the Weather Waste of Coal	6
Adjustment of Station Meters	6
Value of Coal Calculated from Sperm Equivalent	6
The Massachusetts Institute of Technology	6
Sawdust as a Purifier of Gas	6
Anticipations of Modern Chemistry	7
Rotating-bar Coal Screen	7
Burnt Iron and Steel	7
Illumination in Warfare	7
EDITORIALS—	
A New Volume	8
Water Supply of Brooklyn: R. P. Stevens Thereupon.	8
The Question of "Sulphur."	8
Sperm Equivalents	9
our Responsibility	9
Soap Bubbles	9
Private Correspondence	9

A NEW VOLUME.

This number opens our Seventeenth Volume. Press of matter leaves no space, or we should proceed to show, from the volume just closed, that in number, variety, novelty, and interest of the subjects discussed by us, particularly those relating to our main specialty, it has been far in advance of any previous volume. Such has been the pressure in this way that an enlargement of two pages of reading matter, now an established part of the Journal, had to be made. We have in the past often promised improvement, and believe it has been attained and is still in progress. This, however, is for our readers to judge. We hear, and hear of, many expressions of approval, and almost none of disapproval. We shall fight it out on this line all the year round.

WATER SUPPLY OF BROOKLYN: R. P. STEVENS THEREUPON.

This subject is so important to so large a number of people that we give it this prominent place. Former allusions have appeared from our pen, to reports that have reached us of defects, contaminations, etc. A long article in the New York *World*, of June 19, recalled our attention to the subject. We shall present extracts from this hereafter, if room permits. In the meantime, special inquiries were made by us of one of our eminent and experienced geologists, especially familiar with the geology of Long Island, Dr. R. P. Stevens, which elicited the following valuable and suhgestive information. Dr. Stevens informed us (we use chiefly his own words) that:

No city in the Union—not even in Christendom—has such supply of pure and wholesome fresh water as the city of Rrooklyn. In every part of the city it is to be found, and can be had, by those who wish, from their own premises and at comparatively little cost.

In Chicago they have to sink many hundred feet, and at heavy cost, yet still it pays. In New York it cannot be had by sinking, but in comparatively few places. This is owing to the rocky bottom of the Island.

But in Brooklyn, such are the peculiar features of the geological underlay of the city, that it may be said to be built over a subterraneous lake of fresh, pure, potable water.

Long Island on its western end is covered with a mantle of drift, piled up along the "backbone,' as high as 180 feet above the tide. This mantle of drift reposes not on rock, save at Ravenswood and along the East River at Hellgate; but upon a thick sheet or bed of Cretaceous clays, which is impermeable to water. Through the loose material composing the drift, surface water permeates and is purified by the great earth filterer one hundred feet thick, and on reaching below the bed of clay is held there, until it finds an outlet, as in the ponds of Jamaica, Hempstead, and along the south shore. But not only there, all along the west shore, the water escapes at low tide, wherever the outcrop of the clay beds gives opportunity.

Here is the source of the springs seen along the creeks in Brooklyn, and vicinity, the springs once visible under the heights, from whence the shipping of New York Harbor once obtained its supply for foreign voyages, and pronounced the best in the world by the captains and voyageurs.

In sinking for the foundations of the gas-holder at the foot of South Eleventh street, Williamsburgh, this underground sheet of water was tapped, and such was the volume of water finding exit, that a heavy steam pump was kept running night and day, to keep the excavation sufficiently dry to lay the foundations of the structure.

Whoever wants water in volume, cheap, reliable, and under their own management, has but to penetrate the superimposed drift, with sufficient sized tubes and shafts, and reach the water-bearing strata beneath, and he shall find water supply which will last as long as the Heavens fulfil their duty, and the ground swallows up the waters that fall upon it.

If manufacturers who use large quantities of water, would obtain their supply from this source, then householders could have larger supplies, if they needed, from the city works, and there would be no need of heavy taxation of city property, to extend the sources of water supply further out on the Island.

THE QUESTION OF "SULPHUR."

At this distance, the Editor cannot pretend or expect to join effectively in the controversy going on in England, about the Gas Referees and connected matters; if only because, having no editorial staff, and obliged to get up the whole paper himself, his powers are not equal to our own growing and accumulating questions on this side the water. Could one man read all the Journals in the world, it might confer on us, in a journalistic point of view, the attribute of omniscience; but, as it is, we humbly confess that the accumulation of *American* technical Journals alone, lying before us awaiting the critical search, is one which will not bear contemplation, without danger of loosing the silver chord and breaking the golden bowl, and destroying whatever remnants of reason we suppose (though we cannot be sure) is still left us.

Therefore we shall not pretend to know all that is going on abroad. The following from the London *Standard*, of June 8th, has however met our eye, and it is just to our readers, as well as ourselves, that we set it before them:

"THE PURIFICATION OF GAS.—American opinion of the Gas Referees' Report.—At a time when the continued existence of the gas referees' department is under consideration, and the quality and state of our London gas are engaging an unusual amount of public attention, it may not be inopportune to note the high opinion which has been expressed by scientific men in America on the report lately made by the gas referees on sulphur-purification. Prof. Wurtz, the most eminent gas-chemist in the United States, and second to none in Europe, in copying the report into the AMERICAN GAS-LIGHT JOURNAL, speaks of it as "a document equally valuable, or rather invaluable, with those we have had before from the referees;" and as regards the new method adopted by the referees of using lime in the purification of gas—a method which has given rise to many hopes and not a little controversy in this country—the professor bears witness to its originality, and states that 'he never met with the suggestion antecedent to this report.'"

The compliment to the present writer, from so respectable a source as the *Standard*, though much beyond his deserts, must receive his thankful acknowledgement. He accepts it only as a mark of appreciation of efforts to deserve approval. But this is not what we had to say, that being rather to give some explanations of one or two points in which the passage quoted might not be understood. One relates to the expression used "the new mode of using lime in the purification of gas," which to a hasty reader, especially to one who has not read the Referees' Report referred to, would be unintelligible. The reference doubtless is to the suggestion of the Referees about using, to separate *bisulphide of carbon*, lime previously saturated with sulphur, or converted into sulphide of calcium.

The other point relates to the closing quotation, which, referring back, will be found in the

first foot-note to page 142, issue of May 2d, 1872, of this Journal. It will be recognized that "this report," in our note reads "the report referred to," and this "report referred to" is one rendered in 1868 to the Manhattan Gas-Light Co., on gas-purification, by us, with the suggestion therein made that sulphide of calcium *was the agent* that abstracted (in part) the bisulphide of carbon in ordinary gas-purification. This was but a general suggestion arising out of general chemical knowledge; and detracts in no way, in our belief, from the merit of the referees in their discovery that sulphide of calcium would actually abstract from gas every trace of sulphur in every form (see our last issue, June 17th, page 195, third paragraph of middle column), nor from their practical following of this up, in the direction of actual improvement in gas-purification.

SPERM EQUIVALENTS.

In our correspondence columns of to-day are many things of interest, surpassing probably in this respect, on the whole, any previous issue. This is encouraging, in beginning a new volume, leading us to hope that we are drawing more into *discussion*, the great instrument of real progress, that class which is at the same time competent to conduct discussion, and interested in the same. This has been an aim of ours from the first. There are many points, as we said, more than can be taken up; but one of these appears of too much importance to be passed by. We refer to the discussion commenced (May 16) by X, and now continued by Y (two unknown quantities, so far as we are concerned.) It would not be becoming in us to interfere now, but we wish to introduce a few remarks on the general subject, and above all to recommend to others this plan of reduction and statement of values. It furnishes the simplest scale for comparison of values, and is founded on the arbitrary photometric standard, 120 grains of sperm burned per hour by a candle. The modes of calculation and reduction are very simple, and we have just space enough left to put on record two simple rules we have ciphered out for practical use.

To get the sperm value per ton of 2,250 lbs.:

1st. Multiply the yield per 2,240 lbs. into the candle-power, and divide by 291·67.

2d. Multiply the yield per pound into candle power, and divide by 0.13021.

Of course these will not serve in places where 2,000 lbs. is called a ton, but must be modified.

It has seemed to us that it would be better if sperm values *per pound* were used instead of tons, on account of this difference in the valuation of the ton. But we have no time now to work out rules for this. Perhaps some of our intelligent readers will amuse themselves in this way.

OUR RESPONSIBILITY.

In a communication under "Correspondence," is one from Mr. Wm. Yorke, of Portland, Me., in which it is held forth that a certain passage in a former editorial "is too absurd for you (us) to publish to such an intelligent class of readers as most of your (our) subscribers are." All we have to plead, we hope in humble mitigation of so severe a sentence as that of Mr. Yorke, is that the statements he refers to were made by us, as as they were made to us; on the authority of three gentlemen well known in the fraternity, whose names are attached to it. Why does not Mr. Yorke haul them also up before his bar? Their names are, Mr. Edward Jones, South Boston Works; Mr. Alfred W. Norton, East Boston Works; Mr. Thomas J. Pishon, Roxbury Works. We doubt not our accomplices in absurdity will come forward and take their share of the punishment.

Immediately after this, Mr. Yorke propounds that no gas works ever made from Westmoreland coal 5.11 feet of gas per lb. of 12 candle power. This is equivalent to 4.38 feet of 14 candles, 4.09 feet of 15 candles, 3.83 feet of 16 candles, and so on. Is it not probable that our "intelligent class of readers" may look on this as "too absurd"?

Mr. Yorke's remarks about the necessity of verifying the station meter, are undeniable. We cannot accept, however, the inevitable inference that must be drawn from them that the above gentleman occupied "a few moments of time" in the way he suggests. With regard to Mr. Goodwin's report also, knowing, as we happen to know, that Mr. G. is a member of the firm that made the station meter used in his experiments, Harris, Brothers & Co., and that his eye was on this station meter almost constantly during his work, it appears to us not very absurd to assume that he verified the water level of the station meter. Still, as aforesaid, Mr. Yorke has here struck out a point which should be cleared up. Mr. Goodwin, when he recovers from his recent severe accident, will doubtless speak for himself. One thing is clear, as all will see, on referring to the sworn affidavit Mr. Yorke alludes to (p. 157), that there is no possibility of admission of Mr. Yorke's suggestion of surreptitious introduction of water into the station meter, without a parallel conclusion which we will not entertain.

Finally, when statements are made to this Journal by respectable gentlemen of the gas fraternity, lying within the bounds of reason, we have not deemed them absurd, or that we are doing other than our duty in publishing them. They may be proved subsequently to be fallacious or incorrect, and *after* they are so proved it would be absurd for us to publish them.

SOAP BUBBLES.

In our excerpts, the item on this subject has led to several inquiries similar to the following:

Dear Sir: Will you please inform me if some great mistake has not been made in "Chemical Excerpt, No. 293." I have tried it faithfully; the more glycerine I add, the more tender the bubbles. If it could be accomplished, it would be a very desirable source of amusement for children. By complying with this request through the columns of your valuable paper, you will oblige a SUBSCRIBER.

We owe therefore some more minute specification. It is recommended to make a good soap solution and let it stand until it becomes very thick and *ropy*, probably a day or two. Then addition of glycerine will produce the effects, according to proportion. We get the instruction from a chemical friend who has experimented. You can however *buy bottles full* of soap bubbles (*in posse*) already prepared, though we don't know where. Our chemical friend described many curious effects producible with such solutions, but we can't give space.

PRIVATE CORRESPONDENCE.

We acknowledge private communications from Professor Sterry Hunt; President Everett of the New York Gas-Light Co.; President Libby of the Citizens Gas-Light Co. of Brooklyn; Prof. A. M. Edwards: Geo. W. Day, Esq.; George Rugan, Esq., Terre Haute Gas-Light Co.; Henry Hunt, Esq., Engineer, Piqua, Ohio, Gas Works; Philip Barry, Esq., Cork, Ireland, and many others; which, from absence and overwhelming occupation, have remained unanswered as yet.

In this connection we have to acknowledge our regret for having unwittingly published what appears to have been a *private* letter, in our last issue, signed "R." We do not think it could have been marked "private," and as it came, not to our *private* office, but to that of the Journal, it was left with the publisher. It would be very well, to avoid such mortifying occurrences, not only to mark such letters "private," but, still better, to address to the private office of the Editor, as per announcement at the head of the editorial columns, an announcement which has always been attached to his name in that place, precisely to obviate such occurrences.

Prof. Henry Wurtz,

Scientific and Practical Chemist and Geologist.

26 PINE STREET, ROOM 36, NEW YORK.
(Office Hours 1 to 4 daily, except Saturdays.)

Geological Explorations and Reports—Chemical Analyses—Advice and Investigations in all the Chemical Arts—Chemical Inventions and Improvements made.

[Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas and Coals. Formerly Chemical Examiner in the U. S. Patent Office Practices as

Patent Agent, Counsel and Adviser

of INVENTORS, in all the CHEMICAL ARTS; for which his great general experience in these Arts, and his special experience inside the Patent Office, have qualified him to an unparalled degree.

Prof. WURTZ is Editor of the AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY, a journal whose circulation and patronage is among classes of the community of the highest position, influence and enterprise; and which furnishes therefore an unequalled medium for communication to the general public of valuable inventions and novel enterprises.

For procuring British and other Foreign Patents promptly, and on moderate terms, Prof. W.'s arrangements are unusually complete and perfect. Inventors may assure themselves of the most *competent, diligent* and *faithful* attention to their interests.

JAMES A. WHITNEY, late Editor of the *American Artisan*, and for four years past President of the New York Society of Practical Engineering, has opened an office as

Patent Agent, Expert in Patent Cases, and Mechanical Engineer,

AT NO. 128 BROADWAY, ROOM 11, NEW YORK CITY,

Mr. Whitney has had a practical experience of more than twelve years spent in pursuits directly connected with industrial operations and Patent Agency business, which will enable him to care for the interests of his patrons in the most satisfactory manner. 298

ROMAN CEMENT.

IMPORTED BY

LAWRENCE & EDWARDS,
298-3m **214 Pearl Street, N. Y.**

JOHN McNEAL & SONS,

MANUFACTURERS OF

Cast Iron Gas and Water Pipe.

Works—Burlington, N. J.
Office—117 Broadway, N. Y.

Having withdrawn from the firm of R. D. WOOD & Co., the practical management of which we have had since the organization of that firm until June 1871, we have now completed our Works for the manufacture of CAST IRON PIPE and Castings generally.

Having immediate rail and water communication with New York and Philadelphia, as well as the coal and iron regions, we have every advantage of situation.

Our experience in the manufacture of Pipe for a great many years, has enabled us in rebuilding to practically apply Machinery and Fixtures of the very best character, to insure *good work*.

We are now prepared to contract for this class of Castings under the most favorable terms.

We have associated with us Mr. H. G. H. TARR, formerly with R. D. WOOD & Co., who will take charge of our sales department in New York. 262-1y

[*Continued from page 7.*]

possesses, in common with other ground light balls, the disadvantage of being liable to be smothered down, while at best it can but light a very limited area of ground. When we enumerate the liability to be tampered with among the faults of the service ground light ball, we would notice that it is without any means of self-protection whatever; so that in Woolwich marshes the men under instruction carry burning light balls. At Malta, not many years since, some old light balls of unknown pattern were ordered to be burnt to add to the effect of a display of fireworks and lights, when it was found, on the ball first lit coming near the end of its time of burning, that it possessed a source of interest quite unlooked for, in the shape of a small shell, which concluded the performance by bursting, being no doubt designed to prevent interference on the part of the enemy, but hardly calculated to encourage the general public. Happily, the sea being at hand, no other light ball was allowed to burn many seconds longer on dry land.

To remedy the faults in the ground light ball, General Boxer proposed to fire a light carrying a parachute, formed to open out and suspend it in the air for a time, so as to illuminate a large extent of ground. Sir William Congreve had proposed a light similarly suspended from a parachute, which he fired into the air by means of a rocket, but which appears never to have been adopted. The Boxer parachute light was approved for the service in 1850, but it does not appear to have been actually used in war either in the Crimea or elsewhere. It may be described as follows:

A hemispherical mass of light composition consisting of saltpeter, sulphur, and red orpiment, is incased in tinned iron, and attached by means of three stout chains and six cords to the seams of a large calico parachute, which is itself folded and forced by hydraulic pressure into a tinned iron case approaching the form of a hemisphere, fitting on to that containing the light, so as to form a complete sphere, except that what we may term the upper pole has a depression on it, and a groove runs in the direction of a meridian connecting the poles. A second tinned iron case fits over that above mentioned, bushed so as to take a fuse opposite the depression in the parachute hemisphere; here is also inserted a little quick-match in a shallow bag, forming a bursting charge, from which a quick-match leader runs round the meridian groove, communicating with priming and a fuse in the lower pole of the light hemisphere. This projectile is fired from a mortar.—*Am. Artisan.*

The Saint Gothard Tunnel.

Scarce has the world ceased its wonderment at some great scientific achievement, or engineering triumph over the obstacles of nature, when fresh schemes, still more gigantic, born of preceding successes, are projected.

The great advantage to be derived by France from the completion of the Mont Cenis tunnel, bringing the cities of that country in intimate communication with the nations of the East, has awakened anew a project to unite Switzerland and Germany by a similar tunnel through the Alps at the pass of St. Gothard. The plan is not altogether new, for ever since the former tunnel was perfected the governments of Switzerland and Germany, influenced by the fear that a vast commerce would be built up and diverted into France by its successful completion, have appreciated the importance of opening a new commercial highway on their side of the Alps. National jealousies have doubtless served to prevent the plan here named from assuming a definite form; but now that these have been to a great extent removed by the events of the past year, we are informed, through the *Iron World and Manufacturer*, that the project has been revived, and that a contract for the construction of the tunnel has been definitely concluded between the Swiss government and a syndicate of German bankers, backed by the support of the Imperial government of Germany.

The importance of the projected tunnel in facilitating travel and influencing a vastly increased traffic between Asia and the north of Europe, cannot be overestimated, and the inauguration of the great enterprise will be looked for with interest by all.

The completion of the proposed tunnel will offer greater difficulties than that through Mont Cenis. It will be twice as long and through rocks more difficult to pierce. The estimated cost of the work is put at $37,000,000, and from the experience derived from Mont Cenis and other similar works in various parts of the world, and the great improvements which have been made in tunnelling machinery, it is confidently anticipated that the enterprise will be brought to a successful termination in a proportionally much shorter time.*Jour. Franklin Institute.*

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

JULY 2, 1872

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$13 00	@	13 50
Kirkless Hall	12 50	@	13 00
English Caking Coals.			
Newcastle Gas	$7 50	@	7 75
Liverpool caking	7 25	@	7 10
British Province Coals.			
International—At Mines, $2 00 in currency			— —
Block House—At Mines, $1 50, Gold			6 25
Little Glace Bay—At Mines, 1 60 Gold			— —
Pennsylvania Coals.			
Penn Gas Coal—Delivered in New York	$6 87½	@	7 10
Westmoreland	6 87½	@	7 10
Shafton	7 10	@	— —
Youghiogheny	7 25	@	0 00
West Virginia Coals.			
MurphyRun	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytons of West Virginia	$14 00	@	14 50
Darlington of Pennsylvania			— —
American Cannel	$10 00	@	10 50
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	16 60	@	16 00
Trinidad Bitumen	— —	@	14 05

Advertisers Index.

☞ In looking for advertisements, see figures 1 to 12, within brackets, at head of advertisement pages.

GAS BURNERS, APPARATUS, ETC.

American Meter Co.—West 22nd st., N. Y., Arch and 22d st., Phil., 23 West st., Boston ... 6
Agency for the Gibson Improvement—W. H. Grenelle, 41 Pine street, N. Y. ... 9
Cast Iron Gas and Water Pipe—Smith & Ellis, York and Meyer streets, Phila., Pa ... 4
Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa ... 7
Cast Iron Gas and Water Pipe—Henry G. Nichols, 14 Platt street, New York ... 5
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, 117 Broadway, N. Y. ... 1
Gas-Burners—C. Gefrorer, 259 Commerce st., Philadelphia, Pa ... 6
Gas Purification—St. John and Cartwright ... 6
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa ... 6
Gasometers, Etc.—Geo. Stacey & Co., Cincinnati, O ... 2
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway ... 4
Gasholders, Etc.—Deily & Fowler, 39 Laurel st., Philadel ... 4
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa ... 5
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia ... 4
Gas Apparatus, &c.—Blanchard & Arnold, Fourth and Fowler sts., Milwaukee, Wis ... 7
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass ... 3
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J ... 3
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill ... 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y ... 5
Patent Gas Exhauster—Smith & Sayre, 95 Liberty sttreet ... 9
The Gas Light Co. of America—Box 5220, New York city ... 4

GAS COALS.

Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., N. Y ... 4
Gas Coals—Bird, Perkins & Job, 86 South st., N. Y ... 5
Grahamite or Ritchie Mineral—27 South Charles street, Baltimore, Md ... 8
Ohio Gas Cannel—George Merryweather, 5½ Pine street, New York ... 3
The Newburg Orrel Coal Company—Chas. W. Hays, Agent in New York, Trinidad Building, 111 B'way, Room 7 ... 5

FOUNDRIES.

Atlantic Dock Iron Works—Hoy, Kennedy & Co., Office 98 Liberty street, N. Y., P. O. Box 2348 ... 3
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md ... 6
Continental Works—T. F. Rowland, Greenpoint ... 5
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons ... 7
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa ... 2
Louisville Pipe Works—Dennis Long, cor. 9th and Water sts., Louisville, Ky ... 7
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa ... 5
Pascal Iron Works—Morris, Taskar & Co., Philadelphia ... 19
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent ... 4

WATER METERS, PUMPS, ETC.

Aubin Water Meter—H. Q. Hawley, Albany, N. Y ... 6
Cast Iron Pipes for Water and Gas—Riley A. Brick, 89 White street, N. Y ... 6
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 193 River street, Troy, N.Y ... 5
Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila ... 6

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, etc., 58 Goerck st., New York ... 8
Clay Retorts, Fire Brick, Tiles, etc.—Wilson & Gardner, Lockport, Westmoreland Co., Pa ... 8
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 916 Market street, St. Louis, Mo ... 5
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene Essex and Bergen sts., Morris Canal Basin, N. J ... 8
Laclede Fire Brick Works, 107 North Levee, St. Louis, Mo ... 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y ... 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila ... 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md ... 6

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal ... 9

MISCELLANEOUS.

Architect and General Gas Engineer—William Farmer, 111 Broadway Room 91 ... 3
A Synopsis of British Gas Lighting—Jas. R. Smedberg, San Francisco, Cal ... 4
American Journal of Science and Arts—Silliman and Dana, New Haven Conn ... 7
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind ... 5
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York ... 8
Journal of the Franklin Institute—Prof. W. H. Wahl, Franklin Inst., Phila., Pa ... 4
On the Advantages of Gas for Cooking and Heating—Magnus Ohren, Lower Sydenham, London, S. E ... 5
School of Mines, Columbia College, East 49th st ... 5
Scientific and Chemical Expert—Prof. H. Wurtz, 26 Pine street, room 36, N. Y ... 7
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J ... 4
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y ... 9

FILE FOR NEWSPAPERS, ETC.

SUBSCRIBERS DESIRING TO PRESERVE THE AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY, can procure a very neat and desirable File or Cover at this office. Price $1, postage prepaid.

GLOUCESTER IRON WORKS.

GLOUCESTER CITY, NEW JERSEY.

DAVID S. BROWN, Pres't. JAMES P. MICHELLON, Sec'y.
BENJ. CHEW, Treas. WILLIAM SEXTON, Sup't.

OFFICE, PHILADELPHIA,
No. 6 North Seventh St., (west side.)

CAST IRON GAS AND WATER PIPE

PIPE CAST VERTICAL.

1½ to 48 inches diameter.

Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS,

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Gas Works. 253-6m

GEO. STACEY. HENRY RANSHAW. WM. STACEY

GEO. STACEY & CO.,

MANUFACTURERS OF SINGLE AND TELESCOPIC

GAS-HOLDERS,

AND ALL KINDS OF

Cast and Wrought Iron Work

Used in the Erection of Gas and Coal Oil Works.

Foundry on MILL STREET; Nos. 33, 35, 37 and 39.
Office and Wrought Iron Works on RAMSAY STREET, Cincinnati, Ohio.

REFERENCE.

Cincinnati Gas-Light Co.	Baton Rouge, La., Gas Co.
Indianapolis Gas Co.	Saginaw, Mich., Gas Co.
Dayton, O., Gaslight Co.	Oshkosh, Wis., Gas Co.
Covington, Ky., Gas Co.	Peoria, Ill., Gas Co.
Springfield, O., Gas Co.	Quincy, Ill., Gas Co.
Terre Haute, Ind., Gas Co.	Champaign, Ills., Gas Co.
Madison, Ind., Gas Co.	Carlinville, Ill., Gas Co.
Kansas City, Mo., Gas Co.	Bowling Green, Ky., Gas Co.
Topeka, Kansas, Gas Co.	Hamilton, Ohio, Gas Co.
Burlington, Iowa, Gas Co.	Vicksburg, Miss., Gas Co.
Nashville, Tenn., Gas Co.	Denver City, Cal., Gas Co.

R. T. Coverdale, Eng'r Cincinnati, and others.

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

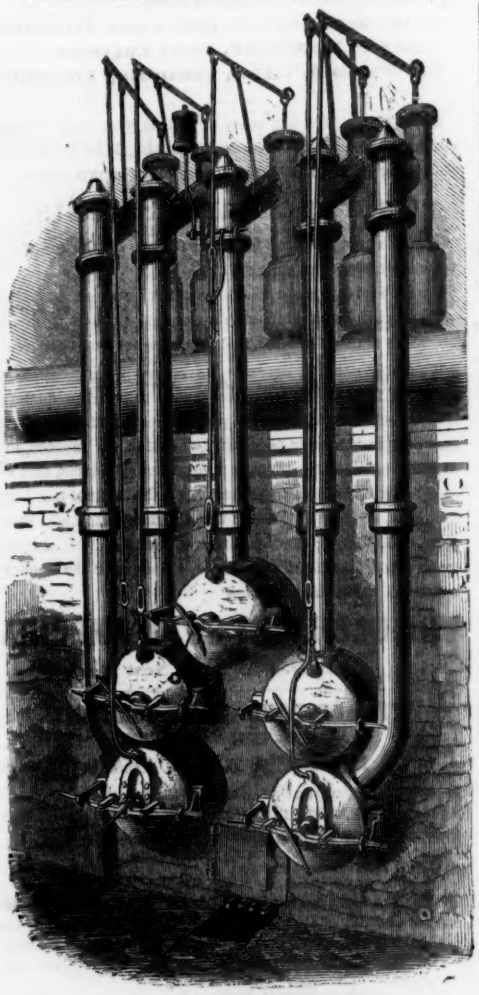
WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS and other buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity, Retort Settings, Condensers, Washers, Exhausters, Purifiers, Holders, Coal Hoisting Apparatus, Iron Roofs, and every description of Machinery required in the Manufacturing of Gas.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Blowers for Forgers,
Pumps for Water, &c., &c.

REFERENCES:

CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
SAMUEL P. PARHAM, Engineer Mutual Gas-Light Company, N. Y.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL.
HENRY J. DAVISON, Engineer, 77 Liberty Street, N. Y.
HERRING & FLOYD, Oregon Iron Foundry, 738 Greenwich Street, N. Y.
FREDERICK SABBATON, Engineer Troy Gas-Light Company, Troy, N. Y.
Col. WHITE, Engineer People's Gas-Light Company, Williamsburgh, N. Y.
GEORGE W. PARSONS, Sup't and Eng'r, Rochester Gas-Light Co., Rochester, N. Y.
GEORGE W. EDGE, Engineer, Jersey City Gas-Light Co., Jersey City, N. J.
J. H. GAUTIER & Co., Fire Brick Works, Jersey City, N. J.
Professor SILLIMAN, New Haven, Conn.
JOHN HARRISON, Engineer People's Gas-Light Company, Baltimore, Md.
CHARLES FABEN, Superintendent and Engineer Toledo Gas-Light Co., Toledo, O.
PETER F. BURTIS, Supt. and Engineer, Chicago Gas-Light Co., Chicago, Ill.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [254-



A. F. HAVENS'S
ADJUSTABLE AUTOMATIC DIP-SEAL,
AND
Improved Retort Lids.

[Described in this Journal of April 16, 1872.]

The Seal closes automatically, when the retort-lid is removed, and is broken by replacing the lid. No mistake can possibly be made. The rods are adjustable in a moment to any contingency. The new attachments are adaptable to any Works. Cost only that of rough castings. No lute used, and no leakage at lids. Half the number of lids only needed. Capacity of mains greatly increased. In new Works no mains. No carbon in retorts, seldom in stand-pipes. 296unl

OHIO GAS CANNEL,
From the Sterling Colliery.

I am now prepared to place in the market, through my agencies as below, a regular and unlimited supply of this valuable Cannel, for gas purposes. A recent analysis, by Prof. WURTZ, Editor of this Journal, at the Laboratories of the NEW YORK GAS-LIGHT COMPANY, gave 47½ per cent of Volatile Matter and 45 bushels to the ton of a fair quality of coke. The yield of gas was at the rate of 9,500 feet per ton of about 27 candle power. It is not highly sulphurous, can be purified by Lime, and the ash from the coke does not clinker.

GEORGE R. TUTTLE, Proprietor,
Cleveland, Ohio.

GENERAL AGENCIES.

George Merryweather, 5½ Pine Street, N. Y.
252

ATLANTIC DOCK
Iron & Machine Works,
FERRIS, WOLCOTT AND DYKEMAN STREETS,
South Brooklyn.

HOY, KENNEDY & CO., AGENTS.

Office 98 Liberty Street. P. O. Box 2,348

HOY, KENNEDY & CO.,
ENGINEERS AND CONTRACTORS

For the Erection or Extension of Gas Works.

PLANS, SPECIFICATIONS AND ESTIMATES.

MANUFACTURERS of every kind of Gas Machinery, Retorts Bench Castings, Wrought Iron Work, Multitubular and Air Condensers, Washers, Scrubbers, Purifiers, Exhausters with every equipment complete for large or small Works, Gasholders, Telescopic or Single; Iron Roof Frames with Cornice Gutters, covered with Corrugated Iron or Slate; Iron Doors and Iron Pivot Blind Windows; Coke Barrows, Fire Tools, Retort Lids, Cotter Bars and Screws, Stop Valves, Tar Valves for Regulating Dip in Hydraulic Mains, Pressure Governors for Street Mains, and Compensators for Exhausters that are unrivalled for unvarying accuracy Steam Engines, Boilers, Etc., Etc.

Agents for G. W. EDGE'S PROCESS for removing Carbon from Retorts.

Post Office Box 2,348. Office 98 Liberty st

CAUTION.

SEVERAL CONTRIVANCES HAVING BEEN DEVISED for the purpose of dispensing with the dip-pipe seal, by means of a valve, or cut-off, between the retort and the hydraulic main, in gas works, since this method of making gas was introduced by the AMERICAN COAL GAS LIGHT IMPROVEMENT COMPANY, all of which are infringements upon Letters Patent, numbered 95,459—116,450—and 119,135, owned by said Company. All Gas-Light Companies are cautioned against the use, without license or authority from the undersigned., of said devices.

The Am. Coal Gas Light Improvement Co.
JOHN H. BLAKE, President.
79 WATER STREET, BOSTON. 41 PINE STREET, NEW YORK

PATENT
OAK AND RATTAN
GAS SCREEN.

It is five years since these Screens, made of Oak and Rattan, for purifying coal gas, were first introduced, and a thorough trial of them made. Up to this time they are used in many of the largest gas works in this country, with the highest approval over all other Screens.

They are so simple in construction and the material used so adapted to the use they are put too, that it is certain no other way of making a gas screen can ever compete with this. Oak is used for the frames, and put together by a round tenant and mortise, using steam-bent oak for fitting around pipes; after which, rattan is interlaced when wet, thus holding the frame firmly together, and *dispensing with all pins or nails*, which are liable to drop or rust out, and in this manner we produce a *light, strong* and *durable* screen with uniform perforations, that will always remain in place, which is not the case with slat trays. They also give a purifying surface of over *one hundred per cent. more* than any other screen, greatly lessening the pressure on the retorts.

A. M. GILES, of the Boston Gas Works says under date 26th January, 1872:

I have used them exclusive of all others for three years past. The purifying surface I find to be nearly *three times that of any other tray*, and their durability has been perfectly satisfactory.

H. A. Allyn. of Brooklyn Gas Works, says:

I have had them in constant use for over two years, and consider them superior to any gas tray made in this country.

Col. J. H. ARMINGTON, Superintendent of Providence (R. I.) Gas Works, after trial of these screens in all his purifiers, says:

The amount of gas purified per bushel of lime (slacked) is six thousand five hundred and fifty-six cubic feet.

GEORGE DWIGHT, of Springfield Gas Works, says, under date March 5th, 1872:

Your screens we have had in use *two years*. They give good satisfaction and wear well.

J. M. Cox, of New Haven Gas Works, says, under date 4th March, 1872:

I have used iron and wood screens of different forms, and *none I have ever seen are equal to yours*, as the gas passes through them under much *less pressure*, and they *purify more gas per bushel of lime*.

We will send a sample screen to any company ordering it, delivering same free to any Express Company in Boston.

We might give quotations from many letters. We give a st of some Gas-Light Companies using them.

Providence, R. I. Gas-Light Co.. Boston, Mass. Gas-Light Co.: East Boston, Mass., Gas-Light Co.; South Boston, Mass., Gas-Light Co.; Springfield, Mass., Gas-Light Co.; New Bedford, Mass., Gas-Light Co.; Manchester, N. H., Gas-Light Co.; Reading, Penn., Gas-Light Co.; Biddeford, Me., Gas-Light Co.; Hartford, Conn., Gas-Light Co.: New Haven, Conn., Gas-Light Co.; New Orleans, La., Gas-Light Co.; Savannah, Ga., Gas-Light Co.; Charleston, S. C., Gas- Light Co.; Trenton, N. J., Gas-Light Co.; Charlestown, Mass., Gas-Light Co.; Dorchester, Mass., Gas-Light Co.; Chelsea, Mass., Gas-Light Co.; Baltimore, Md., Gas-Light Co.; Manhattan, N. Y., Gas-Light Co.; Cincinnati, Ohio.; Gas-Light Co.: San Francisco, Cal., Gas-Light Co.: Albany, N. Y., Gas-Light Co.; Sacramento, Cal.; St. Joseph, Mo., Gas-Light Co.; Leavenworth, Kansas, Gas-Light Co.; Macon, Ga., Gas-Light Co.; Roxbury, Mass., Gas-Light Co.; Lansinghburg, N. Y., Gas-Light Co.; Bridgeport, Conn., Gas-Light Co.; Stamford, Conn., Gas-Light Co.; Poughkeepsie, N. Y., Gas-Light Co; Scranton, Penn., Gas-Light Co.; Lewiston, Me., Gas-Light Co., and one hundred others.

Address **A. P. JAQUES, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass.

TO GAS COMPANIES,

THE ADVERTISER HAVING HAD MANY YEARS EXPERIENCE as Engineer and Superintendent of Gas Works, is open to an engagement in any part of the States. Understands keeping accounts of a Gas Works. Address E. M. P., office of this Journal. 253-unl

KEYSTONE IRON WORKS,

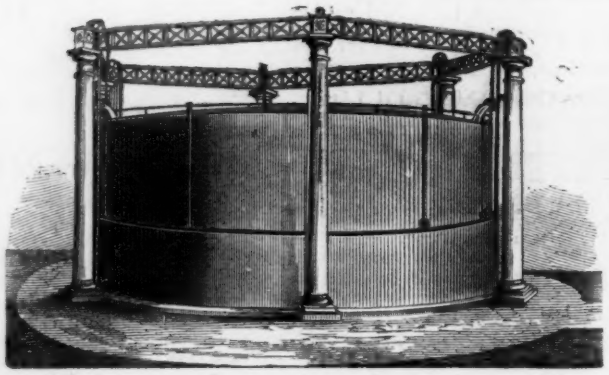
2132 FILBERT STREET, Philadelphia,

G. W. KRAFT, Proprietor,

MANUFACTURES

GASOMETERS.

COAL CARS, PURIFYING BOXES, COKE BARROWS.



WATER TANKS. REFORT HOUSE ROOFS.

Wrought Iron Work for Bridges, Buildings, Steam Boilers, Tanks, Stills, &c.

Particular Attention paid to Alterations and Repairs.

PROVIDENCE

Steam & Gas Pipe Co.,

PROVIDENCE, R. I.,

BUILDERS OF

Coal and Rosin Gas Works,

FOR TOWNS AND MANUFACTORIES.

Estimates furnished of the cost of Works, and cost to Manufacture Gas in any Locality.

Gasholders,

Iron Truss Retort House Roofs,

Water Tanks,

Purifier Covers,

Coke Barrows,

Cast Iron Socket Pipe.

Particular attention given to Enlarging and Re-building Gas Works.

For Lighting Manufactories, our Rosin Gas Works have been successfully used for *many years* past. They require but small outlay, and afford a *safe* and *economical* light.

FOR SALE AT MANUFACTURERS PRICES:

EXHAUSTERS AND COMPENSATORS,
IRON AND CLAY RETORTS,
FIRE BRICK, CLAY AND TILE,
ROMAN CEMENT AND ROSIN,
STATION AND CONSUMERS' METERS.

REFER TO

Manufacturers' Gas Co., Fall River, Mass.; Youngstown Ohio, Gas Co.; New Rochelle, N. Y., Gas Co.; Homer and Cortland, N. Y. Gas Co.; Danbury, Conn., Gas Co.; North Bridgewater, Mass., Gas Co.; Cold Spring, N. Y., Gas Co., Rockville, Conn., Gas Co.; Taunton, Mass., Gas Co.; Pawtucket, R. I., Gas Co.

Frederick Grinnell, President, J. C. Hartshorn, Treas, S. Millett Thompson, Secretary.

Office and Manufactory, corner of Pine and Eddy Streets, Providence, Rhode Island.

Office in Syracuse, N. Y., No. 1 Granger Block.

H. A. BRANCH, Agent.

MITCHELL, VANCE & CO.,

Manufacturers of

CHANDELIERS!

And Every Description of

GAS FIXTURES,

Also Manufacturers of

Fine Gilt, Bronze and Marble Clocks, warranted best Timekeepers, Mantle Ornaments, &c.

Salesroom, 597 BROADWAY,

(Rear Entrance 140 Mercer Street,)

NEW YORK.

Spec designs furnished for Gas Fixtures for Churches
Publi lls, Lodges, &c.

Smith & Ellis,

IRON FOUNDRY & PIPE WORKS,

Philadelphia.

SEVERAL THOUSAND 3, 4, AND 6 INCH CAST IRON GAS PIPES OH HAND, FOR IMMEDIATE DELIVERY.

☞ GAS WORKS CASTINGS OF ALL KINDS.

291-6m

P. P. DEILY, J. FOWLER.

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PENN.,

BUILDERS OF

GAS WORKS,

MANUFACTURERS OF

GAS-HOLDERS,

WROUGHT IRON ROOFS,
CHARGING-SCOOPS, COAL WAGONS,
COKE BARROWS, AND ALL WROUGHT
WORK CONNECTED WITH GAS-WORKS.

Particular attention paid to the Extension of Works and Repairs to Gasholders, Purifiers, Etc.; also, Builders of Water Tanks, Oil Stills, Etc.

REFER TO

M. H. Jones, Easton Gas Co., Penn.
Franklin Woolman, Burlington Gas Co., N. J.
O. W. Goodwin, Camden Gas Co., N. J.
Benjamin Acton, Salem Gas Co., N. J.
D. H. Smith, Watkins Gas Co., Watkins, N. Y.
W. F. Warner, Oswego Gas Co., N. Y.
E. Wilcox, Joliet Gas Co., Ill.
Messrs. Woodbury, Walter & Potter, Kalamazoo Gas Co., Michigan.
H. H. Fish, Utica Gas Co., N. Y.
W. J. Ball, Terre Haute, Indiana.

(TO BE PUBLISHED SHORTLY.)

"A SYNOPSIS OF BRITISH GAS-LIGHTING."

900 pages, large 4to, profusely illustrated.

This is the only compend of Gas-Lighting ever projected, and will be the standard work of reference among Companies, Manufactures, Engineers, Patentees, and Scientific Men generally.

Price $15, payable on delivery.

It will be sold only by subscription, which should be addressed to the compiler, JAMES R. SMEDBERG, Consulting Engineer S. F. Gas Co., San Francisco, Cal., or Editors American Gas-Light Journal, No. 42 Pine street, N. Y.

SABBATON'S PATENT Coke and Coal

SCREENING SHOVELS.

MADE FROM BEST MALLEABLE IRON.

FURNISHED WITH LONG OR D HANDLES

Perfect in their operation. Very strong, and from their great durability vastly more economical than any substitute. Refer to all the principal Gas Companies in the country, who acknowledge them as the "ne plus ultra" of Coke Screening Shovels.

Orders addressed only to

O. R. BUTLER,

Sole Agent.

No. 96 Maiden Lane, N. Y.

OFFICE OF

THE GAS-LIGHT CO. OF AMERICA

C. K. GARRISON, President.
E. W. McGINNIS, Secretary and Treasurer.
JOHN P. KENNEDY, Chief Engineer.
LEONARD D. GALE, Consulting Chemist.

Gentlemen: We beg leave to inform you, that we have purchased the Patent process for making ILLUMINATING GAS from PETROLEUM and its products, known as the

Gale and Rand Patents,

and we are now prepared to treat with you for the use of said process by your Company.

We are also prepared to contract for putting said process into successful operation in your works, furnishing all the necessary plans, materials, and workmen for that purpose.

We do not deem it necessary to enter upon a detailed description, here, of the processes above referred to, deeming it sufficient to state, to secure your interest and investigation, that they have been in successful operation, for months, in a number of Gas-Light Works in the United States, and are now being introduced in the works of the Mutual Gas-Light Company, of New York City; the Citizens' Gas-Light Company, of Brooklyn; the New Orleans, San Francisco, and very many other Gas-Light Companies throughout the country.

For full particulars, address

THE GAS-LIGHT CO. OF AMERICA.

248-tf **P. O. Box 5220, New York City.**

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested 204-1y

JOURNAL OF THE FRANKLIN INSTITUTE.

Editor—Prof. W. H. Wahl, Ph.D.

ASSISTED BY THE COMMITTEE ON PUBLICATIONS.

This Journal, devoted to Mechanical and Physical Science Civil Engineering, and the Arts and Manufactures, published in monthly numbers of seventy-two pages each, forming two volumes per annum, illustrated with engravings and woodcuts.

The Journal is now in its forty-fifth year of publication, and has become a standard work of reference.

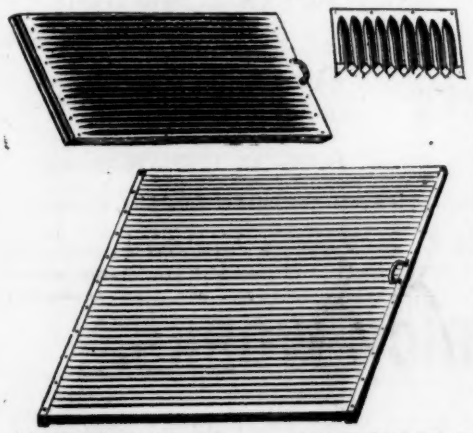
Terms of Subscription.—Five dollars per annum; payable on the issue of the sixth number. When the full subscription five dollars) is paid in advance, the numbers will be sent *free of postage*

Communications and letters on business must be directed to the Actuary of the Franklin Institute, Philadelphia,

J. L. Cheesman,

MANUFACTURER OF

Patent Conically and Diamond Slotte d Solid Wood Trays.



The advantages of these Trays over those made of iron, are economy (they being over 200 per cent. cheaper than iron and will last twice as long), a greatly increased purifying surface, and a saving of time and labor in removing lime, as it does not adhere to the smooth surface of the Wood Trays, as is the case with the iron. The top cut represents the new diamond slotted or reversable Tray, a very superior improvement.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.

CHELTENHAM

Fire Brick and Clay Retort Works.

EVENS & HOWARD,

PROPRIETORS,

MANUFACTURERS OF

FIRE BRICK,
CLAY RETORTS,
GAS HOUSE TILE,
BLAST FURNACE TILE,
CHIMNEY TOPS,
SEWERAGE PIPE from 3 to 30 inch diameter,
SUPERIOR DRY MILLED FIRE CLAY, ETC

OFFICE, 916 MARKET STREET.

241-1y **St. Louis, Mo.**

Bird, Perkins & Job,

IMPORTERS OF

Pictou,
Sydney,
Lingan,
Caledonia,
Westmoreland and Newcastle

COAL,

ALSO,

Ince Hall, Scotch, and Red Bank Gas House Cannel.

103 STATE ST., Boston. 27 SOUTH ST., N. Y. [24

NATIONAL FOUNDRY

AND PIPE WORKS.

OFFICE AND WORKS—CARROLL, PIKE, SMALLMAN AND WILKINS STREETS,

PITTSBURGH, PA.

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE BRANCHES, CONNECTIONS, T's, ELBOWS, and all CASTINGS USED AT GAS AND WATER WORKS,

We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

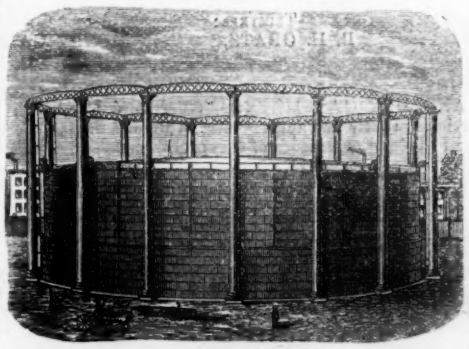
☞SEND FOR CIRCULAR AND PRICE LIST.☜

T. F. ROWLAND,

Continental Works,

GREENPOINT, BROOKLYN, N. Y.

ENGINEER, AND MANUFACTURERS OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

B. S. BENSON & SON,

No. 112 BROADWAY, N. Y., ROOM 1.

MANUFACTURERS OF

CAST IRON GAS & WATER PIPE,

And Fittings for Gas & Water Mains, &c.

All sizes from 3 to 30 inches, cast vertically, in lengths of 12½ feet.

SCHOOL OF MINES,

COLUMBIA COLLEGE,

EAST 49th STREET, NEW YORK.

FACULTY:

F. A. P. BARNARD, S.T.D., LL.D., President.
T. EGLESTON, Jr., E.M., Mineralogy and Metallurgy.
FRANCIS L. VINTON, E.M., Mining Engineer.
C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.
JOHN TORREY, M.D., LL.D., Botany.
CHARLES A. JOY, Ph.D., General Chemistry.
WILLIAM G. PECK, LL.D., Mechanics.
JOHN H. VAN AMRINGE, A.M., Mathematics.
OGDEN N. ROOD, A.M., Physics.
JOHN S. NEWBERRY, M.D., Geology and Palæontology.

The plan of this School embraces a three years' course for the degree of Engineer of Mines, or Bachelor of Philosophy.

For admission, candidates for a degree must pass an examination in arithmetic, algebra, geometry and plain trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. For further information and for catalogue, apply to

DR. C. F. CHANDLER,
252-1y Dean of the Faculty.

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.
Company's Office, No. 52 S. Gay Street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
SINCLAIR & AGNEW, Agents, Alexandria, Va.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 224-1y.

PLYMOUTH IRON WORKS.

MANUFACTURERS OF

Cast Iron Gas and Water Pipe,

FROM TWO INCHES TO SIX FEET DIAMETER.

HENRY G. NICHOLS,

SELLING AGENT.

14 PLATT STREET, N. Y. 291-6m

LUDLOW

Valve Manufacturing Co.

OFFICE 193 RIVER STREET, TROY, N. Y.

Make Valves—Double and Single Gate—⅜ inch to 36 inch, for Water, Gas and Steam.

"CINCINNATI, March, 1870.

"I would say that if any certificate or affidavit is desired in relation to the superior character of the Ludlow Valve above others that I have seen, the same will be cheerfully given. I think, however, that the Valve proves for itself.

"JOSEPH MAYER,
"Superintendent Water Works.

"DAYTON, OHIO, June 27, 1870.

"I have to say that we find them always in order—operating easily unde all degrees of pressure. In a words they have given perfect satisfaction in every particular.

"GEORGE LEHMAN,
"Chairman Water Works Committee.'

"CANTON, OHIO, June 27, 1870.

"We are now using and have been, since the commencement of our works, your valves, and they are proving entirely satisfactory.

"JOHN S. SHORB,
"Superintendent Water Works."

"PEORIA WATER WORKS, July 1870.

"With pleasure I can testify to their superiority. The action has been perfect under all degrees of pressure, a have given perfect satisfaction.

"S. A. KINSEY, Ex. Sup't.
"JOHN J. STEGER, Sup't.

"BROOKLYN GAS LIGHT COMPANY

"I take great pleasure in saying tha tthey give perfect tisfaction—opening easily and quickly, and requiring no eff to start them; even after they have been closed for month

"A. F. HAVENS, Engineer."

"OFFICE OF PHILADELPHIA GAS WORKS, 14th June, 1870.

"I am pleased to state that the lot of large Gas Valves bought from you (Hart & Buck), as agents of the Ludlow Manufacturing Co., have given me perfect satisfaction. The double gate water valve, bought for a special purpose, also works admirably. We want no better valves. The Indicator on your valves is a great improvement over the old style.

"THOS. R. BROWN, Engineer."

MURRAY & BAKER,

Practical Builders,

And Contractors for the Erection of Gas Works,

MANUFACTURERS OF ALL THE LATEST AND MOST IMPROVED APPARATUS AND TOOLS FOR THE MANUFACTURE & DISTRIBUTION OF COAL GAS.

☞ WORKS AT THE RAILWAY DEPOTS,

FORT WAYNE, INDIANA.

We manufacture Bench Castings, Washers, "The Immersed Multitubular," and Atmospheric Condensers, Wet and Dry-Lime Purifiers, Dry Center Seals, Telescopic and Single Gas Holders, Wrought Iron Trussed Roof for Iron or Slate, Wood and Iron Trays for Purifiers, Coke and Coal Carts, Wrought Iron Screening Shovels and Castings, and Wrought Work of every description for Gas-Works.

As Mr. Murray is a Practical Draughtsman, we will furnish plans and specifications to parties or associations, or will wait personally upon parties contemplating the construction of new works, or the alteration or extension of old ones.

The most satisfactory references can be given, if required, of the experience and commercial fairness which characterizes our dealings.

We would respectfully invite Western men to call and see our patterns and works here. MURRAY & BAKER,
198-1y Fort Wayne, Indiana.

THE AMERICAN METER COMPANY.

Organized under the General Manufacturing Laws of the State of New-York.

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE-PRESIDENT. THOMAS J. EARLE, SECRETARY.

TRUSTEES:

SAMUEL DOWN WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, Superintendent at Philadelphia.

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all articles in their line appertaining to the use of Gas Works.

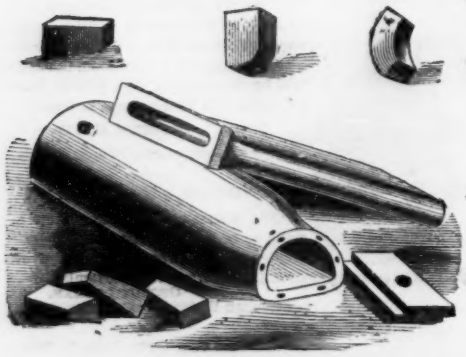
The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of Workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty-Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. 321 Washington Street, Boston, will meet with prompt attention.

BALTIMORE RETORT AND FIRE BRICK WORKS.

GEO. C. HICKS & CO.



CLAY RETORTS FOR GAS WORKS AND SUGAR REFINERIES.

TILES AND BLOCKS OF ALL KINDS.

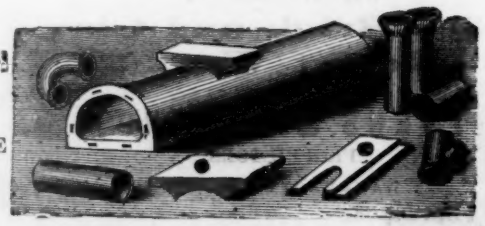
FIRE BRICK.

FIRE MORTAR, CLAY AND SAND.

ALL KINDS OF FIRE CLAY MATERIALS.

The Only XX Fire Brick.

☞ RETORTS OF THE VARIOUS SIZE KEPT ON HAND.



Vitrified Steam Pressed Drain and Sewer Pipe.

HARRIS & BROTHER,

ESTABLISHED 1848.

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, Wm. Wallace Goodwin.

GAS PURIFICATION.

St. John and Cartwright's NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime.* Takes out *all the ammonia.* Now operating in the following Gas Works: Harlem; New York (21st street); Port Morris; Hunter's Point; East New York; Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St. Albans, Vt.; Pawtucket, R. I.; Meriden, Ct., and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

For further information and instructions, apply to
ST. JOHN & CARTWRIGHT,
21st Street and Avenue A, New York Gas Works.

☞ Immediate arrangements are urged, as the demand for he prepared composition is increasing *so rapidly* that delays supply may occur.

C. GEFRORER,

Manufacturer of

GAS BURNERS,

GAS HEATING AND COOKING APPARATUS,

FITTERS' PROVING APPARATUS. ETC.,

No. 248 North Eighth Street, Philadelphia.

RILEY A. BRICK & CO.,

MANUFACTURERS OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

GAS WORKS & MACHINERY CASTINGS

OF EVERY DELCRIPTION,

No. 89 White Street, New York.

RILEY A. BRICK. JAS L. ROBERTSON.

B. S. BENSON,

MANUFACTURER OF

Cast Iron Pipes and Fittings,

AND

GAS AND WATER MAINS.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,

BALTIMORE, MD.

The Aubin Balanced

VALVE WATER METER.

(Used also for Oils and Liquors.)

Is now in use by many city water companies, because of its LOW PRICE, Simplicity, Durability, Accuracy under any pressure, and, (a great advantage) because it runs with less head than any other meter used.

Manufactured H. Q. HAWLEY, Albany, N. Y.

R. D. WOOD & CO.,

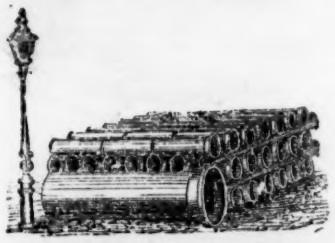
PHILADELPHIA.

MANUFACTURERS OF

CAST IRON GAS & WATER PIPES,

Matthews Patent Hydrants,

Lamp Posts, Etc.



For the accommodation of parties who may want small lots Pipe for *immediate* delivery, we have established a yard in New York City.

We have on hand here several thousand feet of small Pipe, from which we can ship orders readily to any part of the country.

R. PAINE, Selling Agent,

No. 173 Broadway, New York,

3-tf SECOND FLOOR.

BLANCHARD & ARNOLD,

Excelsior Car Wheel Works,

Cor. Fourth and Fowler Sts., Milwaukee.

MANUFACTURERS OF

Gas Apparatus,

Bench Castings,

Air and Immersed Tubular Condensers,

Improved Dry Scrubbers,

Purifiers with Imp'd Dry Centre Valves,

and every description of apparatus necessary for large or small Gas Works.

The designs for our apparatus are furnished by JAMES H. WALKER, Engineer and Superintendent Milwaukee Gas Works, who can be consulted on all matters relating to the working, erection of new, or extension of old works.

Parties employing us will find their orders promptly attended to, and satisfaction guaranteed in all cases.

The best references given on these points. 244-6m

S. FULTON & CO.,

PLYMOUTH IRON WORKS,

CONSHOCKEN, PA.,

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy and Light Castings of every description.

412 Walnut street, Philadelphia, Pa.

SAMUEL FULTON, THEO. TREWENDT

AMERICAN JOURNAL OF SCIENCE & ARTS,

FOUNDED BY PROF. SILLIMAN IN 1818,

And now numbering 100 volumes, in two Series of 50 vols. each.

Editors and Proprietors: Profs. Silliman and Dana.

Associate Editors: Profs. Gray and Gibbs of Cambridge, and Newton, Johnson, Brush and Verrill of Yale.

Devoted to Chemistry, Physics, Geology, Mineralogy, Natural History, Astronomy, Meteorology, etc.

A Third Series in MONTHLY numbers, making two volumes a year of about 450 pages each, from January, 1871. Subscription price $6.00 a year, or 50 cents a number.

A few complete sets on sale of the first and second series.

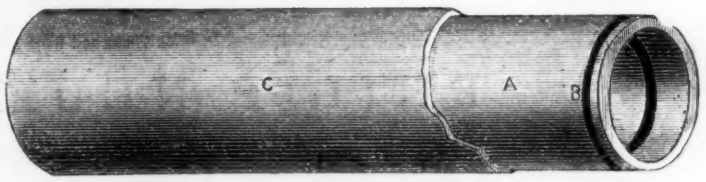
Address, **SILLIMAN & DANA,** New Haven, Ct.

NORTHWESTERN GAS AND WATER PIPE COMPANY.

WORKS, AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 646 WABASH AVENUE.

SECTION OF GAS PIPE.



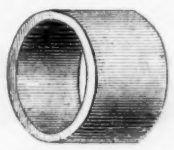


FIG. 2.

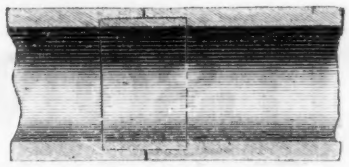


FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the NORTHWESTERN GAS AND WATER PIPE COMPANY.

This Pipe is made of White Pine, one inch to sixteen inches bore, in sections eight feet long, rounded in a lathe, coated inside and out with Asphaltum, connected with a tenon, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is UNQUESTIONABLY the best Gas conducting Main in use.

☞ Send for Descriptive Pamphlet and Price List. 242-1y

DENNIS LONG & CO.,

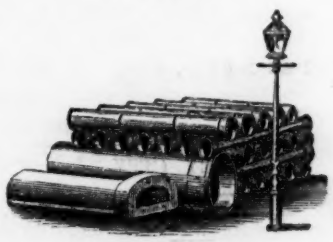
Union Pipe Works,

Louisville Pipe Foundry,

AND

Union Foundry and Machine Shops,

LOUISVILLE, KY.



MANUFACTURE

Cast Iron Gas and Water Pipe,

All Pipe cast vertically in dry sand.

2 inch Pipes in 8 feet lengths. 3 inch to 60 inch cast in 12 feet lengths.

RETORTS AND MOUTH PIECES, LAMP POSTS, CONDENSING PIPE, HYDRAULIC MAINS, PURIFIERS, DRIPS, ELBOWS, T'S, CROSSES, SLEEVES, VALVES, &c., &c.

GAS-HOLDERS.

And every description of work necessary for Gas or Water Companies.

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS, for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves,

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

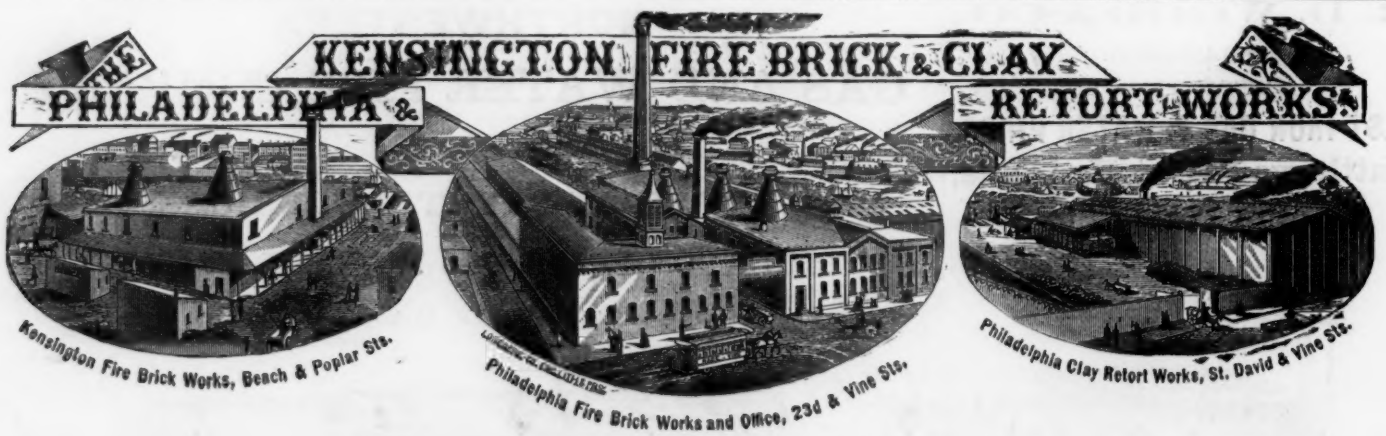
With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER


THE
PHILADELPHIA &
KENSINGTON FIRE BRICK & CLAY
RETORT WORKS.
Kensington Fire Brick Works, Beach & Poplar Sts.
Philadelphia Fire Brick Works and Office, 23d & Vine Sts.
Philadelphia Clay Retort Works, St. David & Vine Sts.

PHILIP NEUKUMET,

(SUCCESSOR TO JOHN NEUKU MET),

Manufacturer of Fire Bricks, Tiles, Gas and Sugar House Retorts.

☞ Plans of Settings for Benches of Threes, Fives, and Sixes furnished, free of charge, upon application.

WILSON & GARDNER.

Works, Lockport, Westmoreland Co., Pa.

Office, 96½ Fourth Avenue, Pittsburgh, Pa., Rooms 1 and 2.

MANUFACTURERS OF

CLAY RETORTS, FIRE BRICK, TILE Etc.

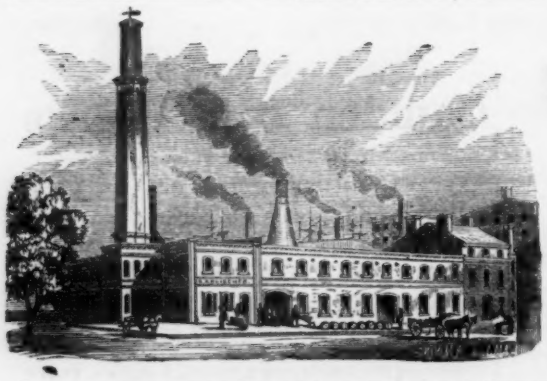
FROM CLAY, SAME SPECIES, AND EQUAL TO

BEST BELGIAN.

☞ ORDERS PROMPTLY FILLED. IMPROVED WORKING PLANS OF THREES AND FIVES UPON APPLICATION.

REFERENCES:

Gas Works Northwest, West, and South.



NEW YORK

FIRE BRICK AND CLAY

Retort Works.

☞ *Established in* 1845. ☜

(Branch works at Kreischerville, Staten Island.)

B. KREISCHER & SON,

OFFICE,

58 Goerck Street, cor. Delancy, N. Y.

GAS RETORTS, TILES & FIRE BRICK
Of all shapes and sizes.

FIRE MORTAR, CLAY AND SAND.

Articles of every description made to order at the shortest notice.

B. KREISCHER & SON.

MANHATTAN

FIRE BRICK & ENAMELLED CLAY

Retort Works,

MAURER & WEBER,

(Of the late firm of B. Kreischer & Co.,)

PROPRIETORS.

Office and Works, 15th Street, Avenue C.

Manufactures of

FIRE BRICK AND LILES,

Of all shapes and sizes.

FIRE MORTAR, CLAY AND SAND.

☞ Articles of every description made to order at short notice. (135

HY. MAURER. ADAM WEBER.

GRAHAMITE,

OR

RITCHIE MINERAL.

The yield of this Asphalt is nearly double, and the Candle Power more than double the product of Gas Coals, and it is extensively used by great and small companies, chiefly as an enricher and stimulant, in the proportion of five per cent. Yield 15,000 to 16,000 feet per gross ton. Illuminating power 30 to 32 candles. One bushel of lime purifies 6000 feet. Coke very strong. It is incapable of spontaneous combustion or caking in the heap, and is used by simple addition to the charge.

We sell at figures which allow a much larger profit to the purchaser, with better light than any standard coal.

No gas material is at once so safe and so cheap. Our Asphalt is used in the manufacture of Varnish, Roofing, Ship Paint, Tiles, Pavements, Water Proof Paper, Cloth, and for all purposes where a coating is required that is unaffected by Water, Gasses, Alkalies, or Acids.

The Ritchie Mineral Resin and Oil Co.

25? 3m No 27 South Charles St., Baltimore, Md.

JERSEY CITY

GAS METER WORKS.

R. M. POTTER & CO.,

MANUFACTURERS OF

CONSUMERS GAS METERS, WET AND DRY,

Station Meters, Center Seals, Governors, Pressure Registers,

AND ALL KINDS OF PRESSURE GAUGES.

Experimental Meters and Standard Test Gas holders,

☞ And all apparatus in use at the Gas Works ☜

14 Morris St., Jersey City, N. J. (1y

LACLEDE FIRE BRICK

AND

Clay Retort Works,

Cheltenham, St. Louis Co., Mo.

Laclede Fire Brick Manufactnring Co.

Office, 901 Pine Street. Warehouse, 1007 N. Levee, St. Louis

NOW READY AND FOR SALE,

FODELL'S

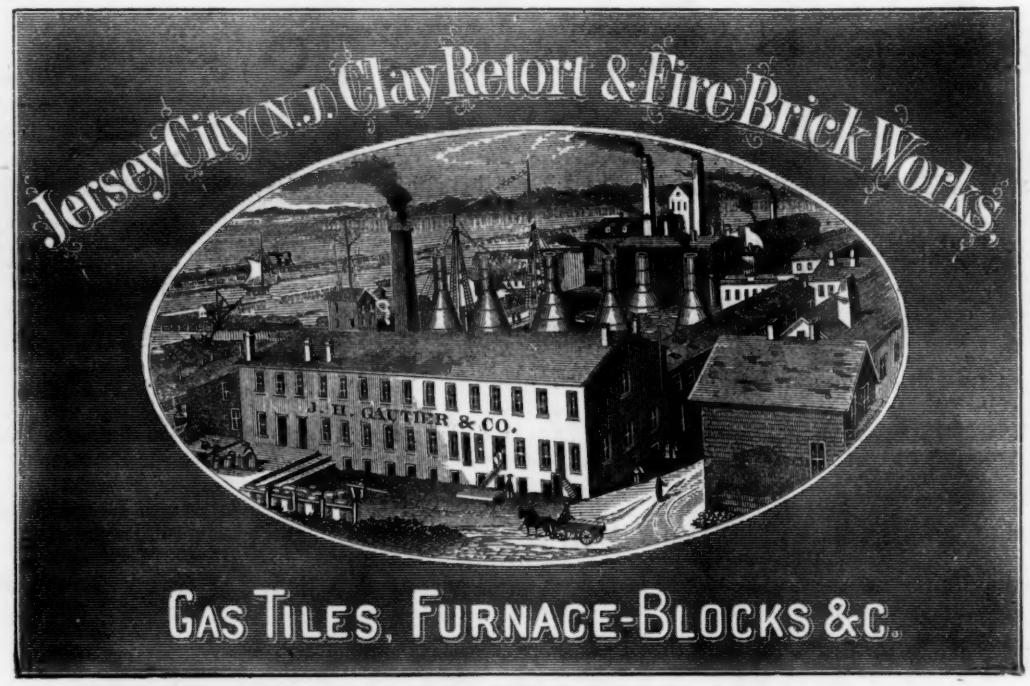
System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order, or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P. FODELL, Philadelphia, or

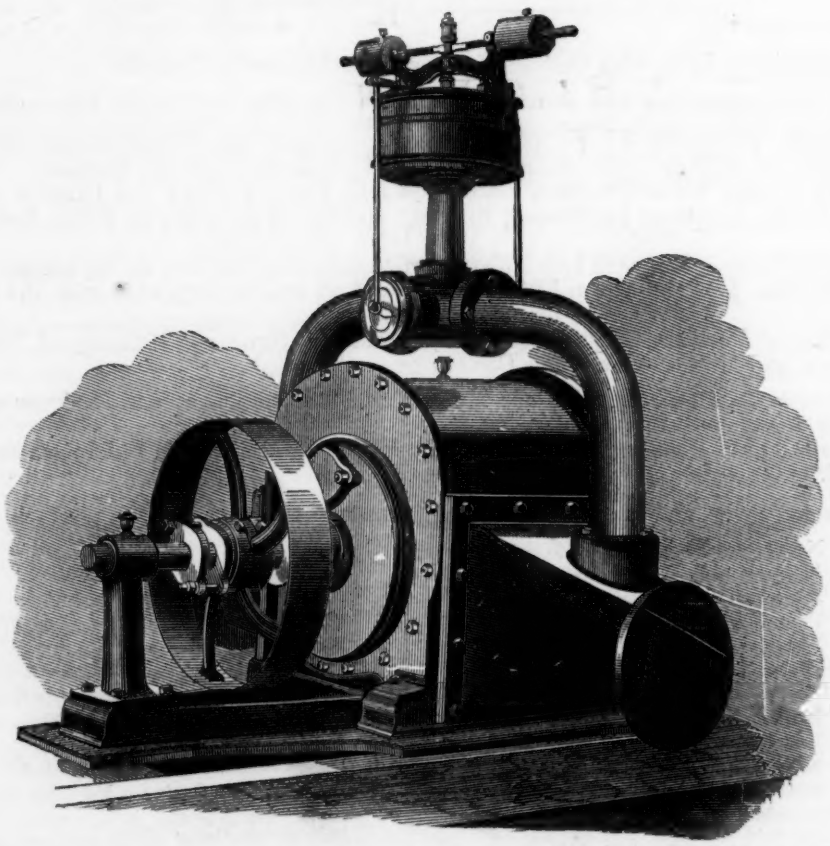
A. M. CALLENDER & CO.,
Office GAS-LIGHT JOURNAL, 42 Pine St., N.Y.



SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

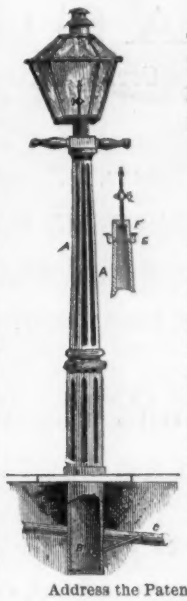
MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the rdinary Fan. The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time equired by the old style Cupola, and 33 per cent fuel. Address

G. G. PORTER, President.
JAMES M. SAYRE, Treasurer.
CHARLES W. ISBELL, Secretary. OFFICE, 95 LIBERTY STREET, New York.

GRAHAM'S

Patent Anti-Freezing LAMP POST.



THE BEST, CHEAPEST AND MOST DURABLE POST EVER OFFERED TO THE PUBLIC.

WOOSTER, OHIO
Jan. 24, 1871.

J. W. GRAHAM,

Dear Sir: Yours of the 14th inst at hand. In reply I would say that we have tested the six anti-freezing Lamp Posts purchased from you, and find them to be all as you represented. Whilst nearly a dozen of our sixty-five Posts were frozen down last month and first of this not one of yours was affected by the heavy frost. What can you sell them at?

Yours truly,
LUCAS FLATTERY
Sec'y Wooster Gas-Light Co.

Address the Patentee,
J. W. GRAHAM,
Chillicothe, Ohio.

250-9t

AGENCY FOR

GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

41 PINE STREET, ROOM 1.

The undersigned having been appointed Special Agent for the introduction of GIBSON'S Substitute for Dip-Pipes in the Manufacture of Coal Gas, respectfully presents for the consideration of Gas-Light Companies the Circulars and Pamphlet issued by the American Coal Gas-Light Imp. Co., descriptive of the value of GIBSON'S Improvement, and the mode by which Gas-Light Companies can satisfy themselves of its usefulness, without trouble or expense, at their own works.

Orders for fitting up Valves of any desired form or patent, *subject to the generality of the Gibson claim*, and also for SUPPLIES and MATERIALS of every description required for the use of Gas Light Companies promptly attended to by

W. H. GRENELLE, Special Agent.

REFERENCE.—RICHARD MERRIFIELD, ESQ., late Vice President MANHATTAN GAS-LIGHT COMPANY.

WORKS UPON GAS.

BOWDITCH.—THE ANALYSIS, TECHNICAL VALUATION, Purification, and Use of Coal Gas, with illustrations, 8vo. cloth. Price, $4.50.

THE GAS MANAGER'S HAND BOOK; consisting of Tables, Rules, and Useful Information for Gas Engineers, Managers, and others engaged in the Manufacture and Distribution of Coal Gas. By Thomas Newbigging; 8vo. cloth. $3.75.

BOWER—Gas Engineer's Book of Reference, illustrated, 4to. Price, 75c.

CLEGG—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. Price, $10.50.

COLBURN—The Gas Works of London, 12mo, boards. Price, 60 cents.

GAS CONSUMERS' GUIDE—A Hand Book of Instruction on the proper management and economical use of gas, etc., etc. 12mo., cloth. Price, $1.00.

HUGHES—Gas Works and Manufacturing Coal Gas, 12mo. Price, $1.20.

MASON—The Gasfitter's Guide, paper. Price, 50 cents.

D'HURCOURT—De l'Eclairage du Gas. Par E. R. Hurcourt, 3d edition. Paris, 1863; 8vo. and plates, $6.00.

RICHARD—Gas Consumer's Guide, 12mo. Price, 50 cents.

SWEET—Special Report on Coal, showing its Distribution, Classification, and Cost, delivered over different routes to various points in the State of New York, and the principal cities on the Atlantic Coast. By S. H. Sweet, with Geological Maps. 1 vol. 8vo. cloth, $3.

SUGG—Gas Manipulation, with a description of the various Instruments and Apparatus employed in the Analysis of Coal and Coal Gas, 8vo., cloth. *Scarce.*

WILKINS—How to Manage Gas; 24mo., paper. Price, 25c.

SCHILLING—Traite d'Eclairage par le Gaz. Price, $22.

For sale by

D. VAN NOSTRAND, Publisher,
23 Murray Street and 27 Warren Street
(Upstairs).

☞ Our new and revised Catalogue of American and Foreign Scientific Books, 80 p. 8vo., sent to any address, on receipt of ten cents in postage stamps. 282

MORRIS, TASKER & CO.,

PASCAL IRON WORKS,

Corner Fifth and Tasker Streets, Philadelphia, and No. 15 Gold Street, New York.

Established 1821.

THOMAS T. TASKER, Jr., STEPHEN P. M. TASKER.

FOR GAS WORKS MACHINERY, ADDRESS CORNER FIFTH AND TASKER STREETS, PHILADELPHIA.

Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

WROUGHT IRON ROOF FRAMES.—For Slate, or Corrugated Iron Coverings, with Cast Iron Cornice Gutter. Iron Doors and Frames, Wrought Iron Pivot Blinds, Windows and all kinds of Castings and Smith Work for Buildings.

BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Gauges.

SCRUBBERS.—Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers.

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Riveted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead Use.

METERS.—Square and Round Meters of any capacity.

GAS-HOLDERS.—Single Lift and Telescopic Gas-holders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

Best quality American Charcoal Iron Boiler Tubes. Wrought Iron Tubes from one-eighth of an inch to ten inches diam., with all kinds of Fittings, Valves and Cocks, Gas and Steam Fitters' Tools, and all articles connected with the manufacture of Gas, Steam or Water.

Sole Manufacturers of P. MUNZINGER's Patent Purifiers, Dry Center Seals, Adjustable Hydraulic Main Stand, Wooden Lime Trays, Stand and Straddle Pipes, and Multitubular Water Condenser.

MR. P. MUNZINGER, Gas Engineer, has been connected with our Establishment as Engineer, and Designer and in charge of the Gas Works Department, for the past fifteen years.

Plans, Specifications, and Estimates furnished for Lighting up Towns, Cities, Factories, and Public Buildings, etc., etc., with Gas from Coal, Rosin, or Wood.

We would refer to the Gas Machinery erected by us, and in operation, at the following places.

Philadelphia, Pa.
Williamsport, Pa.
Altoona, Pa.
Willkes Barre, Pa.
Honesdale, Pa.
Harrisburgh, Pa.
Erie, Pa.
Hanover, Pa.
Easton, Pa.
Lancaster, Pa.
Lock Haven, Pa.
McKeesport, Pa.
Allentown, Pa.
Lebanon, Pa.
Uniontown, Pa.
Washington, Pa.
Hudson City, N. J.
New Brunswick, N. J.
Salem, N. J.
Newark, N. J.
Freehold, N. J.
Englewood, N. J.
Jersey City, N. J.
Elizabeth, N. J.
Camden, N. J.
Flemington, N. J.

Metropolitan Works, N. Y. City.
Binghamton, N. Y.
Rome, N. Y.
Utica, N Y.
Port Jervis, N. Y.
Elmira, N. Y.
Niagra Falls, N. Y.
Flatbush, N. Y.
Westchester, N. Y.
Batavia, N. Y.
Fredonia, N. Y.
Columbus, Ohio.
Mansfield, Ohio.
People's Works, Cleveland, Ohio.
Newark, Ohio.
Salem, Ohio.
Wooster, Ohio.
People's Works, Chicago, Ill.
Chicago Gas-Light and Coke Co., Ill.
Jacksonville, Ill.
Peoria, Ill.
National Asylum for Discharged Volunteer Soldiers, Milwaukee, Wis.

Detroit, Mich.
La Porte, Ind.
Lawrence, Kansas.
Salem, Oregon.
Port-au-Prince, Cal.
San Jose, Cal,
Stockton, Cal.
Illinois State Penitentiary, Joliet,
Hartford, Conn.
Hagerstown, Md.
People's Works, Baltimore, Md.
Elkton, Ind.
Milledgeville, Ga.
Augusta, Ga.
New Orleans, La.
Shreveport, La.
Louisiana Ice Manufacturing Co.
Nashville, Tenn.
Murfreesboro, Tenn.
Jackson, Miss.
Houston, Texas.
Galveston, Texas.
And a number of others.

☞ See page for Index to Advertisements.